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USSR Report

SCIENCE AND TECHNOLOGY POLICY

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ECONOMIC MECHANISM OF INTEGRATION OF SCIENCE, PRODUCTION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA EKONOMICHESKAYA in Russian No 5, Sep-Oct 84 pp 37-48

[Article by Yu. V. Lobedev: "The Means of Improving the Economic Mechanism of the Integration of Science and Production"]

[Text] The important problem of the acceleration of scientific and technical progress and the improvement of the economic and organizational forms of the integration of science and production is examined, the basic principles of this integration at the level of the economic activity of the industrial enterprise are specified, the possibilities of the use of the standardized method for the implementation of the new forms of the organization of scientific activity and the individualized approach to the evaluation of the results of scientific organizations and industrial enterprises in scientific and technical progress are established.

The June (1983) CPSU Central Committee Plenum specified as one of the most important directions of the increase of the efficiency of socialist production the improvement of the economic mechanism and the bringing of it in line with the achieved level of the development of productive forces. The central task of the improvement of the economic mechanism at the present stage is the identification of the most efficient economic and organizational forms of the integration of science and production.

The posing of this task is predetermined by the intensity and scale of the qualitative changes which are occurring today in productive forces due to the use in production practice of the advanced achievements of science and technology.

The industrial enterprise is the completing link in the realization of scientific and technical progress. In its production activity it is possible to distinguish two directions: the first is the fulfillment of the production program in conformity with the plan and the second is the development of production for the purpose of achieving a saving of social expenditures of labor. The existence of these two functions is responsible for the realization by the industrial enterprise of two structures of relations: one

with regard to the stabilization of production activity (the "stabilization" function) and the other with regard to the development of production (the "development" function).

At present the solution of the problem of improving the integration of science and production is mainly aimed at the change of the relations between the sectorial scientific research organization and the industrial enterprise. From this it follows that the economic and organizational questions of the improvement of the management of scientific and technical progress concern only one aspect of the production activity of the enterprise--the function of development. The attempt to find in this way a solution of the problem of improving the integration of science and production eliminates from the field of view the other aspect of the activity of the industrial enterprise--the function of stabilization.

The one-sided orientation in the solution of the indicated problem only toward the function of development explains the fact that all the measures on the improvement of the economic mechanism and the organizational forms of the integration of science and production, which have been implemented in our country in the past 20 years, for the most part concerned the activity of sectorial scientific research organizations. Today the sectorial scientific research organizations are changing over in the planning of scientific research work and experimental design developments to the system of supply orders. A number of sectors have begun the introduction of a new system of the financing of research and development by means of credits of the State Bank and payment for the work, which has been completed and accepted by the client, instead of the existing stage-by-stage settlements between the client and the performer.

The need for the consideration of the two functions of the production activity of enterprises in the solution of the problem of improving the integration of science and production is stressed by a number of Soviet economists. Thus, G. Lakhtin believes that inasmuch as current production and scientific and technical development serve a common goal--the utmost meeting of the needs of society, the improvement of the economic mechanism should be aimed at ensuring the unity of these two aspects of production [4].

Thus, without having solved the problem of the integration of the two indicated functions in the production activity of the modern industrial enterprise, it is impossible to solve successfully as a whole the problem of the integration of science and production.

The determination of the economic content of the relations of science and production is one of the central issues of the named problem. There merits interest, in our opinion, the stand of G. Lakhtin on this issue, who writes: "Changes in production act as the end result of the realization of scientific achievements. Obviously, these changes should be the object of planning both for sectorial science and for production. But for this it is necessary to reduce all the diversity of the changes occurring in production to a single generalizing measure, at the basis of which, in our opinion, there should be the technical and economic level of production" [4, p 12].

The indicated stand differs significantly from the generally accepted stand, which is based on the economic impact of the introduction of scientific and technical measures in the national economy.

Thus, the approach proposed above, it seems to us, is more constructive, since in the end society organizes research, development and the introduction of their results not for the obtaining of an economic impact for the second year of use (the first year after the standard period of assimilation), but with regard to the qualitative transformation of production, which ensures the saving of social expenditures during all subsequent periods. Therefore we also believe that the change of the technical and economic level of production characterizes more accurately the economic essence of the relations of science and production. However, it should be recognized that the function of stabilization and the function of development are in a different qualitative relationship to the technical and economic level of production. For the "stabilization" function the technical and economic level of production is the basis which determines the quantitative and qualitative indicators of its realization. For the "development" function the technical and economic level is the basis for the measurement of the economic results of scientific and technical progress. The changes of the technical and economic level of production will be the criterion of the evaluation of these results.

In the system of state planning when formulating the Basic Directions of the Economic and Social Development of the USSR National Economy 22 indicators of the technical level of production are used, which it is possible to unite into 3 groups: the indicators which characterize the qualitative level of the planned volume and range of output; the indicators which reflect the qualitative level of labor at the enterprise; the indicators of the basic economic results from measures on the increase of the technical level of production.

It seems to us that the set of indicators, which characterize the technical and economic level of production, should be distinguished from the set of indicators characterizing the technical level of production, which has been adopted by the USSR State Planning Committee. This distinction consists first of all in the fact that the set of indicators, which characterize the technical and economic level of production, should be of a more specific nature. It is necessary to develop such a set of indicators as applied to each individual technological process (type of output) and to determine its quantitative and qualitative parameters.

The use of indicators of the technical and economic level of production in the planning and evaluation of the activity of industrial enterprises presumes specific changes in the principles of planning and the enlargement of the set of indicators of evaluation.

The achieved level is the initial level in the planning of the industrial activity of enterprises, which is based on the indicators of the technical and economic level of production. The use of indicators of the technical and economic level of production for the evaluation of the industrial activity of enterprises presumes that along with the quantity, quality and timely delivery of products the production process itself is also evaluated. Thus, the

production process is also a component of the result of production activity, while its indicators are qualitative characteristics. The set of standards, which regulate the conditions of the realization of the production process with regard to all the technical, economic and ecological aspects, should constitute the basis of such an evaluation.

If the production process has been realized with deviations from the established standards, this should find reflection in the combined evaluation when summarizing the results of economic activity. Here it is important that the economic mechanism would envisage the assurance of the reimbursement of society for losses, if they have occurred through the fault of the enterprise.

It is necessary, in our opinion, also to use the standardized method when planning the scientific and technical development of production. Such an approach is already being implemented in the national economy: since 1981 the decrease of the production cost per ruble of commodity production has been set for enterprises among the other indicators. True, this indicator is planned with respect to its level during the past year, while the basic technical and economic indicators in case of the evaluation of a scientific and technical measure are calculated with respect to the parameters of the equipment being replaced. Many economists note the need for the use of the standardized method in the management of the scientific and technical development of production (see [1, 2, 6, 8]). However, in our opinion, these should be not "individual standards according to the types of equipment, the conditions of its production and use," as V. Deryabin and V. Smagin suggest, but sectorial or subsectorial standards. Otherwise the development and use of standards will be a too labor-consuming job, and their essence will be eroded, if it is taken into account that each scientific research operation has its own features, which are characteristic only of it.

Thus, the use of the standardized method of the management of both the production process directly and the process of its scientific and technical development is the basic direction in the improvement of the mechanism of the integration of science and production.

The indicated direction poses the problem of reevaluating the role of the basic economic categories, by which we are guided today in the realization of the economic mechanism. First of all it is a question of the economic impact of new equipment--the basic criterion of the evaluation of the integration of science and production.

In the process of the elaboration and implementation of a scientific and technical measure the magnitude of the economic impact undergoes a certain metamorphosis. At the stage of the planning of research and development the so-called predicted economic impact is calculated. Its calculation is based on the hypothetical technical and economic indicators of the expected scientific and technical decision and the predicted conditions of use. The magnitude of the predicted economic impact is very conditional, but precisely it is today the criterion when determining the advisability of starting research and development.

After the completion of the scientific and technical operations the planned or, as it is sometimes called, guaranteed economic impact is calculated. The calculation of this economic impact is distinguished from the predicted impact by the fact that the technical and economic characteristics of the scientific and technical decision are known; the characteristics of the conditions of use are closer to the actual ones.

The planned economic impact is determined with respect to the amount of the national economic need or the total volume of replacement of old equipment in operating production.

And, finally, the actual economic impact is calculated on the basis of the actual technical and economic indicators of the scientific and technical innovation and the real conditions of its use.

Practical experience shows the significant differences between the planned, predicted and actual economic impacts. It should be noted that the conditions of the use of a scientific and technical decision, the change of which is connected with both objective and subjective factors, are the basic factor which decreases the magnitude of the actual economic impact relative to its predicted magnitude.

The economic impact is a value which is defined as the difference of the adjusted expenditures. Its magnitude is the result of two components: the individual technical and economic characteristics of the scientific and technical decision (the quality of the decision) and the conditions of their realization in the production sphere (the scale of use). It should be noted that the economic impact is to a certain degree a conditional value, since its calculation in accordance with the accepted Standard Method of the USSR State Committee for Science and Technology is made during the first 2-3 years after the standard period of the assimilation of new equipment, when the scale of the use of the new equipment has not yet reached the maximum. This situation has a decisive influence on the evaluation of the scientific and technical activity of sectorial science. Within the prevailing economic principles the distribution of the actually derived economic impact of the introduction of new equipment is carried out by the method of concordance (partial compromise) between the developing organizations and the introducing enterprise. Most often the economic impact is divided equally between science and production. The lack of a method of distribution between the impact, which belongs to science, and the impact, which belongs to production, serves as an explanation of this. Thus, S. Pirogov writes: "However, so far it has not been possible not only to find a more or less satisfactory solution of the problem of the 'proportionate sharing' of science, but also to formulate clearly an approach to its solution. It seems to us that the posing of the question of the proportionate sharing of science in the impact of new equipment is illegitimate" [5].

A number of contradictions exist in the very principle of the calculation of the economic impact of new equipment. As is known, the principle of the comparison of the different expenditures, which have been adjusted to common conditions of use, is the basis of the method of adjusted expenditures. However, it is impossible to achieve such an identity in the absolute, since

for this it is necessary to unwind the entire chain of conjugations which are connected with the realization of the impact. In reality the method of adjusted expenditures makes it possible to take into account a conjugation of not more than the second order. Here in the base version the capital-output ratio of the product, which exists at the given moment, is taken as the amount of capital expenditures, while in the comparable version not only the capital investments in fixed production capital, but also the expenditures on research and development are taken into account. In such a case with respect to its content K_1 is not identical to K_2.

What was said above makes it possible to draw the conclusion that the economic impact, which reflects the amount of net income during the first 2-3 years of the use of new equipment, is incorrect as a category which determines the relationship of science and production. Owing to this it is necessary to use other categories which are equal to this relationship.

The saving of social expenditures of labor in the sector (subsector), in which it is used, is the basis for the calculation of the economic impact of new equipment. In the end society organizes the scientific and technical development of production in order to achieve a saving of specific types of raw materials, materials, fuel, energy and manpower and capital resources. Moreover, not the partial, but the maximum saving, which is achieved in case of the use of new equipment to the full extent, is important for society. The annual scale of the saving is the generally accepted form of the evaluation of the economic activity of the sectors of physical production, which also applies to the evaluation of new equipment. The amount of the total saving depends on its specific quantity and on the scale of the possible use of new equipment, which is governed by the state of production at the moment of its introduction. Within the standardized method the saving will be calculated according to the sectorial (subsectorial) standards, which characterize the achieved technical and economic level of production and the volume of the output being produced, with respect to which the scientific and technical development of production is being carried out.

Thus, standardized indicators of the production activity of the enterprises of the given subsector should be used for the evaluation and the comparison of the economic significance of new equipment. This makes it possible to avoid contradictions in the evaluation of the saving as applied to different objects of introduction. As a result scientific and technical activity receives a unified evaluation in contrast to existing practice, when the magnitude of the economic impact can be different subject to the object of introduction. From what has been said it follows that the magnitude of the saving should also be determined by the standardized method.

It seems to us that the standardized saving from the use of new equipment can play a very important role. In our opinion, the solution of such a problem, which is important and has been least elaborated in economic theory, as the determination of the expenditures on scientific and technical measures as a whole and on the individual stages of the science-production process: development and introduction, is possible on its basis.

The point is that the search for a solution of the indicated problem today is aimed at the elaboration of standards by the method of direct calculation. Meanwhile the attempt to elaborate such a method for each individual stage of the "science-production" cycle poses the need for the solution of a large number of such methodological problems as the formation of the structure of the research-introduction process, the determination of the set of its economic standards and of the classification of scientific and technical tasks as a consequence of the nonuniformity of their scientific and technical nature, as well as the conditions of their use, the calculation of the standards under the conditions of scientific uncertainty, which is inherent in the process of scientific and technical activity. The impossibility of solving these problems by the traditional method of direct calculation had the result that the practice of planning the expenditures on research and development and on the introduction of its results reduces to the use of such poor (from a methodological point of view) techniques as the method of analogy and a partial compromise, which is achieved each time between the developer and the client.

This gives rise to dependent sentiments of sorts among scientific research organizations and to the lack of a stimulus for the saving of the assets which have been allocated for scientific and technical purposes.

It seems to us the accomplishment of such an important national economic task as the determination of the expenditures on research, development and introduction can be found, as we have already said, within the standardized approach and on the basis of the theory of the efficiency of social production.

The current theory of the efficiency of socialist social production defines the efficiency of its physical sphere as the ratio of the amount of the annual physical volume of the net output (v+m) to the amount of public assets which have been advanced to this sphere. Thus, T. Khachaturov writes: "The impact derived by society is reflected to the fullest extent by the indicator of the national income--such an understanding at present is becoming nearly universally accepted" [7].

Whereas the question of the expression of the impact in the theory of production efficiency to a significant extent is adequately elaborated, the question of the amount of social expenditures has not yet found its unequivocal settlement. We adhere to a position which is based on the accounting of all the advanced public assets--the fixed production capital and working capital of enterprises. V. Krasovskiy adheres to the same position: "On the theoretical level it is a question of the accounting of not only the consumed means of labor, which is discerned by the indicator of amortization, but also, what is the main thing, the accounting of the used fixed capital, which, as was noted by Marx, uses over a lengthy period its entire mass and its entire capacity. This mass of used capital is not reflected by the indicators of amortization. In reality the country has the capacity of not one-twentieth of the entire mass of capital, but annually uses the capacity of capital to its full extent, namely 100 percent" [3].

Thus, the sum of all the fixed production capital, which is on the balance sheets of enterprises (FC), and the working capital of enterprises, including the above-standard balance at the end of the year (AB), should be taken into account in the denominator of the formula of the calculation of the efficiency of physical production.

Consequently, the efficiency of physical production (E_p) can be expressed by:

$$E_p=[(v+m)]/(FC_pAB_p). \quad (1)$$

The ratio of the amount of the standardized saving and the production efficiency, which has been achieved in the given sector (subsector), makes it possible to determine the value of the upper limit of the expenditures as a whole on a scientific and technical measure (S_{max}):

$$S_{max}=C/E_p, \quad (2)$$

where C is the standardized amount of the annual saving from the introduction of a scientific and technical measure.

Thus, the standardized amount of the maximum permissible expenditures on a scientific and technical measure will be determined by the achieved level of production efficiency in the sector (subsector) and the standardized amount of the annual saving from this measure.

The use of the theory of efficiency makes it possible to divide the standardized amount of the annual saving into the amount, which is governed by the quality of a scientific and technical decision, and the amount, which is determined by the scale of its use.

The quality of a scientific and technical decision is determined by the change of the quality of production, that is, through the change of the level of production efficiency. The latter in turn is manifested through the change of the ratio of the values of (v+m) and (FC+AB).

Consequently, the increase of the quality of production, which is expressed by the increase of its efficiency, will determine the quality of the scientific and technical decision. Hence the saving, which is determined by the quality of the scientific and technical decision, can be expressed by the relative saving of advanced social expenditures of labor:

$$E_p \times (FC_p+AB_p)=S_n. \quad (3)$$

Then the amount of the saving, which is obtained due to the scale of the use of the scientific and technical decision, is equal to:

$$S_{pr}=S-S_n. \quad (4)$$

On the basis of the standardized method of determining the saving, which is obtained from a scientific and technical measure, and determining the proportionate sharing of science and production it is possible to calculate

the amount of the maximum expenditures separately for research and for introduction.

In accordance with the prevailing statutes of the calculation of the economic impact of new equipment a lower limit of efficiency, which is equal to 0.15, has been established for capital expenditures. Hence the ratio of the saving, which is obtained due to the scale of introduction in production, to the standard of the effectiveness of capital expenditures (E_n) determines the upper limit of the expenditures on introduction ($S_{pr.max}$).

$$S_{pr}/E_n=S_{pr.max}. \tag{5}$$

The upper limit of the expenditures on scientific research developments ($S_{n.max}$) can be calculated as the difference:

$$S_{max}-S_{pr.max}=S_{n.max}. \tag{6}$$

Since, as we have already noted, the annual economic impact is the expression of the net income, which is defined as the difference between the annual saving and the amount of capital expenditures, which have been adjusted to an annual scale, let us determine the standardized amount of the annual economic impact which falls to:

the scientific research organization (Ef_n):

$$C_n-(S_{n.max}E_p)=Ef_n, \tag{7}$$

where E_p is the production efficiency in the subsector which is introducing the new equipment;

and the industrial enterprise (EF_{pr}):

$$C_{pr}-(S_{pr.max}E_n)=Ef_{pr}. \tag{8}$$

The standard amount of the annual economic impact of a scientific and technical measure (Ef_N) as a whole will be equal to:

$$Ef_N=C-[(S_{n.max}E_p)+(S_{pr.max}E_n)]. \tag{9}$$

Thus, owing to the standardized method it is possible to determine in a standardized manner the most important economic indicators of a scientific and technical measure.

The use of the categories of the maximum expenditures, the saving and the economic impact makes it possible, in our opinion, to broaden the limits of the use of cost accounting in the sphere of scientific activity.

It should be admitted that at present only one of the functions of cost accounting--the material stimulation of the developers of new equipment--finds use in sectorial scientific research organizations. With the introduction of the new procedure of financing scientific research work and experimental design developments by means of credits of the State Bank it is proposed to

strengthen the cost accounting relations between science and production also in the area of financing and the payment for completed operations. However, since the scientific research organization does not have internal working capital, such a measure cannot have a significant influence on the increase of the role of cost accounting in science.

The use of the standardized method in the economic mechanism of the integration of science and production makes it possible, in our opinion, to achieve this goal.

First of all it is important to note that the possibility of determining the standardized amount of the maximum expenditures on research and experimental design operations makes it possible to organize in a new way the material stimulation of the developers of new equipment.

The principle of material stimulation, which is in effect today in sectorial science, reduces to the establishment of the bonus in proportion to the amount of the actual economic impact of the introduction of the developments of an institute. The bulk of the material reward for the work, the wage, is paid subject to the amount of the actually worked time. The evaluation of the effectiveness of the work of scientific associates and scientific and technical personnel is made once in 3-5 years during the period of their certification.

As a result of this the stimulating role of the basic reward for labor--the wage--decreases significantly. Today the basic contradiction in the existing system of the material stimulation of scientists consists in the fact that the bonus, to which a decisive role in stimulation has been assigned, is paid in accordance with the results of the introduction of a development. It is well known that a significant time lag lies at times between the period of development and the introduction of its results. Here the scientific research organization cannot always have an influence on the conditions of introduction. Therefore a direct dependence does not exist between the results of the work of scientists and the amount of the bonus. Under these conditions material stimulation even in scientific research organizations, where the planning and organization of operations are carried out on the basis of supply orders, for the most part is carried out quarterly, in accordance with the results of the fulfillment of the plan of scientific research work. Only the principle of the formation of economic stimulation funds has changed. As a result the distribution of bonus assets has again returned to the averaging out of the amount of the bonus subject to the average percentage of the reward to the amount of the actual wage fund of the scientists.

It seems to us that any attempts to increase the stimulating role of the bonus, which is calculated from the actually derived impact, will not yield the desired result. We propose a different approach.

Since the possibility exists to determine the amount of the maximum expenditures on scientific research and experimental design work, it is also possible to calculate the standardized amount of the wage fund. In the total expenditures on scientific research and experimental design developments the overhead comes to about 50 percent. If we subtract from the remaining

50 percent the amount of the fixed deductions, we will obtain the standardized (maximum) amount of the wage fund of the developers.

The real amount of the wage fund will differ from the standardized amount due to the coefficient of its adjustment in accordance with the time factor. As is known, the coefficient of adjustment is $a_t=(1+E_p)^t$, where the efficiency achieved in production acts as the standard of efficiency. For one-time expenditures on introduction the coefficient of adjustment will be calculated on the basis of the standard of efficiency (E_n), which is equal to 0.15. From this it follows that the longer the period of development is, the smaller real amount of the wage will be paid to its developers. Thereby the economic mechanism makes it possible to use the lever for the stimulation of the shortening of the time of the elaboration of a scientific and technical measure.

At the same time the use of the standardized amount of the wage fund makes it possible to organize in a different way the work of the scientific collective on the elaboration of the scientific and technical measure.

Today the planning and financing of scientific research on the basis of supply orders envisage that the scientific collective can perform two, three and even more scientific research operations in accordance with registered supply orders. In this case, as we have indicated, the halting of the financing of one development does not entail the decrease of the amount of the wages of scientists. The amount of the bonuses, which are paid to developers, as a rule, does not exceed 8-10 percent of the total amount of the wage of the worker. Therefore it is very important to increase the stimulating role of the wage in science, having linked it directly with the results of the work of the scientific collective. It seems to us that the solution of this problem is possible on the basis of the standardized method of determining the most important economic parameters of scientific research work.

However, the standardized method comes into conflict with the very principle of the organization of the labor of scientists and developers at sectorial scientific research institutes and design bureaus, and first of all with the inertness of its organizational structure. In conformity with the prevailing statute the management of the sectorial scientific research institute and design bureau has the right to change annually the structure of the scientific research organization. However, in practice such reorganization is possible no more often than once in 3-5 years, since the formation of new scientific groups and their location on the old areas and the transfer of specialists from some subdivisions to others inevitably decrease the efficiency of the work of the scientific collective. Therefore it is necessary to change the organizational procedure of the formation of scientific collectives. For this the work of all the scientific and technical and technical and engineering personnel, who perform a service function in the process of scientific development, should be centralized. In other words, it is necessary to reject the principle of a natural economy, which today is flourishing in sectorial science. In accordance with this principle, the scientific research group, sector, laboratory or department strives to have on its staff both scientific and scientific and technical personnel. As a result of the nonuniform workload and the relative organizational autonomy of each scientific

collective the efficiency of the use of engineering and technical and scientific and technical personnel decreases. A paradox results: as a rule, there are not enough scientific and technical staff members, meanwhile it is impossible to link up rapidly the scientific and technical and engineering and technical staff members from other subdivisions, who are not too busy, owing to their administrative structural isolation. The centralization of the work of these categories of workers of sectorial science will make it possible, in our opinion, to eliminate the existing problem of the shortage of these workers and on this basis to organize scientific labor more efficiently.

A temporary structure of the scientific collective should be formed only from categories of scientists and leading specialists. In this case the reform of the organizational structure will not be so painful, since the engineering and auxiliary services are centralized. A change of scientific themes, which is inevitable in the work of any scientific search organization, will require the bringing of the structure of scientific collectives in line with them. Their regrouping in connection with the tasks being worked on will make it possible to use more efficiently the labor of scientists and, what is the main thing, the financial and material resources which are being allocated for development. The functioning of the centralized services can be carried out on the basis of the principles of cost accounting with temporary scientific groups, when the work is being performed for them. The accounting of the expenditures of the working time of scientific and technical personnel and the use of equipment and instruments for the study and accomplishment of scientific tasks and the performance of pilot operations is carried out in conformity with the nature of the work being performed. The use of this principle, in our opinion, will solve the problem of the economical and centralized use of scientific equipment, sectorial centralized services and the organization of the redistribution of valuable single-design equipment.

The scientific collectives, which are formed for the time of the accomplishment of a scientific and technical task, after the completion of the work are broken up and are formed anew for the solution of new problems. The opportunity to evaluate in accordance with the results of the completed work the contribution of each scientist arises here. For the purpose of increasing the responsibility of scientists the formation of scientific collectives should be carried out by competition. If a scientist has not justified the hopes placed in him with respect to the results of work, he will receive less than was proposed. Here he will also have to prove in the future his right to conduct scientific research by more effective work.

The opportunities, which the proposed system of the organization of scientific research affords, are not confined only to the fact that a procedure of the individual, immediate evaluation of the work of each specialist in accordance with the results of the completed work is being introduced. Here we see a kind of principle of the "brigade method" within the scientific collective, in which each person is responsible for the results of the work and each person receives the corresponding reward in proportion to the level of his skills, the nature of the job being performed and the quality of its results. Collective interest in the quickest and high quality solution of a scientific and technical problem will be a mighty factor of the improvement of the work of all the links of the scientific research organization.

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SCIENTIFIC, TECHNICAL PROGRESS AS FACTOR OF INTENSIFICATION OF ECONOMY

Moscow EKONOMIKA I MATEMATICHESKIYE METODY in Russian Vol 20, No 4, Jul-Aug
(manuscript received 24 Feb 84) pp 581-590

[Article by V. P. Loginov (Moscow): "The Acceleration of Scientific and Technical Progress Is the Most Important Factor of the Intensification of the Economy"]

[Text] The second half of the 20th century has been marked by repeated revolutions in the broad spheres of science and technology. Fundamentally new discoveries in physics, chemistry, biology, medicine, space research and other fields of knowledge are transforming the nature of physical production and are leading to substantial changes in social life, as well as in the daily life of people. Some optimists claim that the world is on the threshold of even more imposing discoveries, that a new, "electronic" civilization will begin in 10-15 years. It is possible not to share the optimism of such predictions, but one thing is indisputable: scientific and technical progress is becoming a more and more powerful factor of the economic and social development of all countries, while the competition of the two socioeconomic systems--the world of socialism and the world of capitalism--depends to a greater and greater extent on the implementation of the achievements of science and technology.

At the June (1983) CPSU Central Committee Plenum it was stated that "in our social development we have now approached such a historical point, when profound qualitative changes in the productive forces and the improvement of production relations, which corresponds to this, not only are ripe, but have also become inevitable" ["Materialy Plenuma Tsentral'nogo Komiteta KPSS. 14-15 iyunya 1983 goda" [Materials of the CPSU Central Committee Plenum. 14-15 June 1983], Moscow, Politizdat, 1983, p 9]. At the December (1983) CPSU Central Committee Plenum it was stressed: "Our planning organs, ministries and departments so far have not found the necessary solutions in order TO PUT TO USE COMPLETELY AND WITH A HIGH RETURN THE AVAILABLE PRODUCTION, SCIENTIFIC AND TECHNICAL POTENTIAL OF THE COUNTRY" [in boldface] ["Materialy Plenuma Tsentral'nogo Komiteta KPSS. 26-27 dekabrya 1983 goda" [Materials of the CPSU Central Committee Plenum. 26-27 December 1983], Moscow, Politizdat, 1984, pp 13-14]. And indeed, the USSR has the largest number of scientists and engineers, with respect to many positions and indicators, which characterize the level of development of productive forces (the smelting of steel, the production of cement and mineral fertilizers, the size of the machine to

pool, the freight turnover of all types of transport, the amount of capital investments in the national economy and so forth), our country has held for a long time and steadily first place in the world, but for all these achievements the rate of the implementation and the effectiveness of scientific and technical progress cannot satisfy us, the changeover of the economy to the intensive means of development for the present is being carried out slowly.

This problem is a multilevel one, in one article, of course, it is impossible to cover even briefly its numerous aspects, therefore hereinafter we will dwell only on the interconnection of scientific and technical progress and the intensive type of expanded reproduction, as well as questions of scientific, technical and structural policy.

In recent times in the press and scientific reports attempts have frequently been made to evaluate the different stages of the development of our economy from the standpoint of the use of the achievements of scientific and technical progress in the national economy and to determine the share of intensive factors in economic growth. Here the efficiency of development, which is expressed by a specific dynamics of macro-indicators, is frequently identified with intensive growth and, consequently, with scientific and technical progress as the most important factor of the intensification of the economy. Since during the past three five-year plans (1966-1980) the best indicators of efficiency were observed during 1966-1970, some economists claim that the most complete use of intensive factors of economic development, including scientific and technical progress, was achieved precisely during this period. In our opinion, in this case the confusion of the concepts of intensive and efficient is occurring. They regard intensive development as a synonym of efficient development and vice versa: extensive development as inefficient development. Other researchers go even farther. On the basis of different kinds of dependences, and most often with the use of production functions, for example, like the Cobb-Douglas function or statistical models they establish the share of intensive factors in economic growth or the share of scientific and technical progress in the creation of the gross national product and the national income at various states of the economic development of the USSR. The evaluations here are different, but, as a rule, the present stage is characterized as less intensive, with a smaller contribution of scientific and technical progress to the increase of the national income.

With regard to the use of the body of mathematics for these conclusions it should be said that a strictly formalized dependence of a limited number of factors (and in the Cobb-Douglas function these are capital, labor and autonomous technical progress) always holds the danger of leaving outside the field of view a large number of conditions, under the influence of which the dynamics of economic indicators is also formed.

As an example of the bringing of all economic and social processes together in the interaction of two factors let us cite a statement of M. Brown, one of the active defenders of the apparatus of the production function: "If the production function changes in such a way that the marginal product of capital increases as compared with the marginal product of labor given any combination of capital and labor, it is said that capital-consuming (labor-saving)

technical progress is occurring. The capital-saving process occurs when the marginal rate of the replacement of capital with labor decreases given any combination of capital and labor" [1, pp 31-32]. Thus, the entire gross product is the result of the interaction of two factors, the ratio between the factors characterizes technical progress.

In real life the interconnection of various technical, economic and social processes leads to significant deviations from this scheme. Moreover, the higher the level of the economic hierarchy is, the more factors and conditions come into interaction. Therefore, whereas it is hardly possible to apply this scheme even with great reservations to the primary "cell" of social production, it is even less possible to apply it to the complex socioeconomic category of the gross product.

Formally the capital-output ratio and the labor-output ratio are interchangeable and a strict dependence exists between them (the greater the former value is, the smaller the latter should be). Hence, ostensibly, it follows that labor productivity (LP) is equal to the capital-output ratio (co) multiplied by the capital-labor ratio (cl): LP=co X cl, and further, the output-capital ratio is equal to LP/cl and so forth.

However, if even the value factor is neutralized, the dynamics of these indicators at different stages of development both for the national economy as a whole and in the sectors often behaves contrary to these conditions. But the whole point is that a purely formal approach, which is applied to the evaluation, for example, of the potential productivity of capital, is not suitable at all for such an evaluation of the possibilities of labor as the human factor, the degree of utilization of which depends on an incomparably larger number of factors. We needed such a lengthy discussion not to criticize the apparatus of the production function and other strictly formalized dependences, which are being used successfully in statistics, planning practice and scientific research, and only then to stress the need for a cautious approach to the evaluation of macroeconomic processes, in which a comprehensive, multifactor analysis should not be replaced by the apparent simplicity of various kinds of dependences.

Returning to the question of the interconnection of the types of reproduction, efficiency and scientific and technical progress it should be said that extensive growth can lead to high indicators of the efficiency of development, if effective sources of growth are used. Purely intensive or extensive growth does not occur, these processes combine with each other, as well as scientific and technical progress--a steady and even inevitable process, which takes place at all the stages of social development. It is entirely a matter of the rate of the accomplishment of this process and the strength of its influence on the economy.

The statements of the classics of Marxism-Leninism serve as the initial thesis in the understanding of the types of reproduction. K. Marx wrote in "Kapital" [Capital]: "over certain intervals of time reproduction and, moreover, if you look at it from a social point of view, reproduction on an expanded scale occurs: expanded extensively, if only the field of production is expanded;

expanded intensively, if more efficient means of production are used" [K. Marx and F. Engels, "Soch." [Works], Vol 24, p 193].

The use of "more efficient means of production," that is, scientific and technical progress, which is embodied in the implements and objects of labor and is combined with more skilled labor in production, is a distinctive trait of the intensive type of reproduction. As applied to the categories of planning this means that the increase of production is achieved by means of the introduction of new equipment and technology with the corresponding increase of the skills of personnel. Such a nature of the development of production is accompanied by a saving of material resources, that is, leads to an increase of the efficiency of the functioning of the entire economy.

The improvement of the implements and objects of labor always accompanies the process of production. Consequently, an intensive nature is characteristic of any type of reproduction. The question is, what share of intensive growth corresponds to one stage or another of economic development? Thus, during the periods of the primarily extensive economic development of the USSR (the postwar five-year plans, the postwar restoration of the national economy) not only the construction and expansion of new enterprises, but also the modernization of operating production occurred. However, although at these stages intensive factors played a substantial role both in economic growth and in the processes of the increase of production efficiency, they did so to a smaller extent than it should be during the present period. The basic "load" fell to the factors of the increase of labor resources in physical production, the transfer of manpower from agriculture to industry, transportation and construction, that is, to the sectors of the national economy with a higher capital-labor ratio and, consequently, labor productivity, the development of virgin lands, the commitment to use of new highly productive deposits of mineral raw materials, fuel, timber resources and so on. That is why, in spite of the primarily extensive nature of development, high rates of production, labor productivity and the efficiency of the economy are characteristic of these stages.

The interconnection of the types of reproduction and its efficiency is not one-sided. If extensive development is accompanied by the commitment to use of new deposits of minerals (as happened during the period of the development of the petroleum and gas deposits of the Volga River region and Bashkiria) or the plowing of fertile lands, it also contributes to the increase of the national economic impact, but without a change of the technical base of production this factor gradually exhausts its positive effect and the dynamics of the indicators of efficiency worsens with time.

Intensive factors at the initial stages of their influence, on the contrary, might not increase production efficiency and, moreover, several indicators (for example, the capital-output ratio and the product cost) might even increase. This is usually connected with the period of the assimilation of equipment and technology, when the expenditures on the production of new implements of labor or materials are still large, while the scale of their introduction in the national economy is insufficient to cause the indicators of production efficiency for the consumers of such technical innovations to fluctuate significantly. But this stage is replaced by the period of the

gradual increase of the scale of the introduction of new equipment, [illegible] expenditures on its production and the operating costs of the consumer decrease, as a result of which the efficiency of social production increases.

Consequently, the remark of K. Marx concerning the fact that intensive development involves the use of "efficient means of production," needs to be understood dialectically, not synonymously at every moment of time, but on the historical level of the development of production.

Extensive and intensive processes in production constantly combine and complement each other; the whole point is, in what ratio they are to each other. At different national economic levels the evaluation of the extensive and intensive nature of development can be different. Thus, it is necessary to assign the expansion of the production of equipment of an invariable type at some enterprise to the extensive process, but if in its qualities it is higher than the equipment which constitutes the bulk of the equipment used in other sectors, then for the national economy as a whole this process is intensive.

In the economic development of the majority of countries, with rare exceptions, it is possible to distinguish two stages. Initially the economy is developed by means of those factors of economic growth, which are connected with the mobilization of resources which can be quickly put to use (idle manpower, natural resources, foreign trade and others). As the extensive sources of growth disappear, it is necessary to change over to the mobilization of internal reserves and to change the technical base of production, which is inefficient without the radical reform of the management and organization of production--these two processes should occur simultaneously, for new, more advanced equipment and technology require not only skilled labor, but also a more advanced system of the management and organization of production, efficient monitoring and accounting.

The large-scale experiment on the broadening of the independence of enterprises and on the reform of the system of management in a number of ministries, which is now being conducted, has as a goal to identify and introduce in practice new forms of cost accounting and the management of the economy.

In case of the transition from primarily extensive to primarily intensive development a decrease of the rates of economic growth and a number of indicators of efficiency is possible, since the changeover of the economy to the new type of reproduction involves a large number of difficulties, including the search for new methods of economic management, the overcoming of the inertia not only of economic processes, but, as was noted at the 26th CPSU Congress, also in economic thinking, some reevaluation of the former achievements, which ambiguously influenced future development, and a knowledge of the new peculiarities and laws of development. During this period the basic proportions of the national economy as a whole and of its most important sectors also change significantly. The demands on the balance of the economy and on intersectorial proportionality in case of the intensive type of reproduction increase sharply, since the increased technical level of production and the mobilization of internal resources with the increase of the scale of their use in themselves already presume a more efficient

ning economic org.nism without significant irregularities and

favorable indicators of the economic efficiency of production during ive-Year Plan as compared with the 9th and 10th Five-Year Plans were result not of the more extensive use of intensive sources of , including scientific and technical progress, but were a consequence of conditions, among which factors of an extensive nature played a ole. One should group with them the more significant scale than subsequent period (1971-1980) of the involvement of manpower in the increase of the production of inexpensive petroleum in the of the Volga River area and the Cis-Ural area, which was later by the redislocation of the bulk of petroleum production to the of Siberia, and the development of the capacity of a number of large facilities, the construction of which began back in the 1950's power plants on Siberian rivers, the Ekibastuz basin and iron ore deposits of the Kursk Magnetic Anomaly and a number of industrial enterprises, which were put into operation precisely during . At that time the economic reform and the changeover to the principle of the management of the economy played a strong role.

technical progress is developing on an increasing scale. It is accept the assumption that the technical base of production Five-Year Plan was not improved. For the growth of labor during the 9th Five-Year Plan and the 1970's as a whole was quite replacement of capital, the introduction of new equipment and increase of the skills of personnel and other factors, which with scientific and technical progress, had the basic influence . During the 9th Five-Year Plan the number of adopted measures ment came to 2,055,000, during the 10th Five-Year Plan--already number of developed new types of machines, equipment and respectively to 15,200 and 14,000. During the 9th Five-Year e policy of the renovation and modernization of production was ,000 units of production equipment were modernized, while during -Year Plan 812,000 units were [2, pp 129, 131]. The capital- in industry increased during the 8th Five-Year Plan by 34 percent, Five-Year Plan--42 percent and during the 10th Five-Year Plan-- , pp 172, 173; 3, p 170].

of the use of this increasing scientific and technical remains urgent, which was discussed at the December (1983) CPSU committee Plenum. In combination with other conditions and factors of scientific and technical progress for the present is not having the influence on the economy, on which it would be possible to count, and negative things are checking its influence. Thus, the labor- of scientific and technical progress, which finds expression in of the unit power and productivity of machines and equipment, in was neutralized to a significant extent by the increase of wages, of which during individual periods the dynamics of the latter the increase of labor productivity. The relative shortage of led to an increase of vacant workplaces, which decreased the degree

of utilization of equipment, and its potentials were not completely realized. At the same time the increase of the cost of raw materials and fuel, unfavorable weather conditions in agriculture during individual years and the slowing of the progressive structural reorganization of industry for a number of reasons acted as negative factors and led to the worsening of a number of macroeconomic indicators, particularly the output-capital ratio and the output-material ratio.[2]

According to our calculations, the increase of the national income by 1 billion rubles was provided during the 8th Five-Year Plan by an increase of fixed production capital by 1,774,000,000 rubles and the number of people employed in the national economy by 118,000. During the 9th Five-Year Plan such an increase requires respectively: 3,733,000,000 rubles and 142,000 people, during the 10th Five-Year Plan--3,488,000,000 rubles and 85,000 people.[3] As we see, during each subsequent five-year plan the specific "expenditures" of capital increase, that is, the capital-output ratio of social production increases, but as a whole its labor-output ratio decreases, especially during 1976-1980.

Consequently, during the past three five-year plans mainly the labor-saving form of scientific and technical progress was implemented in our country.

Meanwhile, the saving of the aggregate expenditures of labor and, primarily, embodied labor is characteristic of the intensive type of reproduction. In case of extensive development, when the expenditures of living labor are still large, while the commitment of new material (especially raw material and fuel) resources to production is of a global nature, since they, as a rule, are inexpensive and their reserves are large, the efficiency of the economy and its growth are provided mainly by the increase of the productivity of living labor. For a long time the average annual growth rate of labor productivity in the USSR came to 6-8 percent and only in the 1970's did it begin to decline to 3-3.5 percent. By the late 1970's a situation had formed, when the further increase of labor productivity was checked by the existence of a large number of unmechanized sections, mainly in ancillary production, in transportation and warehousing operations, in the sphere of trade and service of the population. Therefore the technical policy, which was aimed at the increase of the unit power of machines and equipment in basic production, in the presence of its unmechanized "rear areas" no longer yielded the former impact from the point of view of living labor. At the same time the increased investment activity of our economy led to the creation of new workplaces, which were not provided with personnel, and, what is no less important, diverted new equipment from operating enterprises, at which it should have replaced obsolete equipment, for the supply as complete equipment to the enterprises being placed into operation.

Thus, the constant expansion of "the field of production" without a significant change of its technical level occurred, since the process of the replacement of old equipment had slowed down.[4]

Therefore a resource-saving production technology, which makes it possible to save on expenditures of aggregate labor, should become the main directions of technical policy. This matter is not simple, and the substantial reform of

the operation of the entire scientific research, experimental design and production base is needed for its accomplishment.

For a long time the increase of the power of machines and mechanisms was the basic direction of technical policy, here proper attention was not devoted to the qualitative and, mainly, parameters of the degree of economy of equipment and as a result with respect to this component of scientific and technical policy we lagged behind the leading foreign countries [as published]. The energy crisis of the 1970's, which forced the countries of the West to change their technology over to an energy-saving type, did not affect us.

Apparently, the entire system of the evaluation of novelty needs adjustment, equipment should not be considered new, if it is distinguished from the base equipment only by greater power, but does not provide a gain in fuel consumption and in the weight of the metal per unit of power, while its operation involves the large consumption of raw materials. The economic thinking of our managers and designers formed during a period, when the country had inexpensive and, it seemed, unlimited natural resources, and it is necessary to change this false idea.

The relationship of the units "equipment-technology" is an important question. Traditionally technology has been adjusted to the available equipment. Meanwhile, at present the fundamentally new discoveries in the area of technology require a completely different system of machines. For example, the introduction of microbiological processes in the working of mineral deposits is leading to some replacement of modern mining equipment. The introduction of robots, microprocessors, minicomputers, integrated circuits and new types of synthetic materials is changing fundamentally the entire production process and is decreasing the optimum size of enterprises. Of course, the extensive implementation of many of these discoveries will occur, perhaps, not soon, but it is already advisable today to direct the efforts of scientists and designers at the search for new technological processes, which make it possible to change in a fundamental way modern, traditional technology in a number of sectors of the national economy.

The improvement of the labor-saving form of scientific and technical progress is also connected with this. The mechanization of labor-consuming operations in ancillary and subsidiary sections of production, and often in the basic ones as well, is being carried out slowly because modern production technology in many sectors is of a cyclical nature, while the system of machines being used has not been integrated both in productivity and in space. Gaps, which are filled, as a rule, with manual labor, exist between operations, the "raw material" is frequently conveyed from machine to machine primarily by the unmechanized method. Thus, the cutter-loader, which increased by many times the productivity of the coal cutter, did not eliminate manual labor on the laying of cable, the clearing of stable holes, the removal of "spills" of coal and so on. In machine building the delivery of parts to the machine tools, their removal, fastening, repair work and other operations, which in total time frequently exceed the basic time of the machining of the part, are performed by hand. It is possible to continue these examples for every sector. All the named operations are necessary and they lend themselves with difficulty to mechanization. There can be only one solution--the combination,

merging of operations into a continuous process, but for this there should be a different system of machines, which is based on a continuous flow, and not a cyclical processing method.

Consequently, the labor-saving form of technical progress is called upon to complement the resource-saving technical policy, but the improvement of the technology, for which a specific system of machines will also be envisaged, also serves as its basis.

A uniform technical policy should be an important element of scientific and technical progress. It implies a program, which has been coordinated with respect to time and parameters, of the development of individual elements of the system of machines, which are produced by various departments. Not everything is well in our country with this as well. Individual units of the system of machines are produced in different subsectors and departments, for example: excavators, dump trucks and dump cars; tractors, combines, pull-type and mounted implements for them; hoisting cranes and railroad rolling stock and so on. Since all these machines operate in gang, their number and performance characteristics should coincide. Meanwhile, due to departmental isolation the times of the assimilation of new models of this equipment and their operating parameters often do not coincide.

For the USSR the regional breakdown is important in technical progress. The diverse climatic, soil and other natural conditions of the different geographical zones of the country make necessary the development of special types of equipment, which has been adapted for operation under extreme conditions. However, standard equipment, which is mainly designed for the European zone of the country, is used in most cases. Therefore in Siberia and the Far East such equipment is not used with the passport productivity, quickly wears out and breaks down, while the expenditures on its repair exceed by several times the initial value. Taking this into account, it is necessary to develop a number of modified versions of machines and mechanisms, which are intended for operation under the conditions of Siberia, permafrost, the zone of deserts and subtropics and mountainous areas, in order to increase labor productivity at the enterprises, which are under extreme conditions, and to decrease the socially necessary expenditures on the operation of equipment.

Structural policy is inseparably connected with scientific and technical policy. In the 1970's the structure of USSR industry changed in the direction of the capital-consuming and resource-consuming type of reproduction, which found expression in the relative increase of the capital-consuming sectors, as well as in the slowing of the growth of the processing sectors as compared with the extractive sectors. Thus, the share in the fixed capital of industry of the most capital-consuming sectors: ferrous metallurgy, the sectors of the fuel and power, petrochemical and timber industry complexes, in 16 years (1966-1981) increased by 0.7 percent with a slight decrease of their share in the total volume of the gross output of industry. The coefficient of the lead of the growth rate of the processing sectors over the extractive sectors decreased from 1.19 during the 8th Five-Year Plan to 1.15 during the 9th Five-Year Plan and 1.14 during the 10th Five-Year Plan (calculated according to [2, p 166; 3, pp 151, 156, 171]).

It is also possible to group with the unfavorable trends the slowing of the leading growth of electric power engineering, the petrochemical and chemical complexes as compared with the fuel sectors. In many ways this is explained by the need for the rapid development of the petroleum and gas industry for the increase of the scale of the export of hydrocarbon fuel, but a resource-saving form of scientific and technical progress within the country could have significantly neutralized this process.

It is possible to halt the objective increase of the cost of raw materials, fuel and energy only by the economical consumption of resources in the national economy by means of the introduction in the sectors, which consume these resources, of the appropriate equipment and technology. But the assets for the retooling of sectors and the development of new processing methods and models of machines and equipment are limited. It seems to us that it is necessary to make good use of these assets and to allocate them to sectors and enterprises in accordance with a specific system of priorities.

At present the assets for retooling are established centrally, but at the same time are formed by means of the internal resources of enterprises. The plan of the technical development of the enterprise and sector serves as the initial one for this. But, first, it is weakly coordinated with the production plan and is as if secondary with respect to the latter, since the production plan is the basis of financing; second, the plan of technical development is drawn up before the production plan, when the resources, which will be allocated to enterprises, are still not clear. As a result the plan of technical development is frequently adjusted, numerous changes are made in it and for the present it does not serve as the document which it should be during the period of the scientific and technical revolution.

But the main shortcoming in the planning of scientific and technical progress is that the assets, which are being allocated for the retooling of sectors and enterprises, are as if "tied" to the production plan, that is, are calculated from the "base," with the exception of the assets, which have been earmarked in accordance with special-purpose programs, and the assets for enterprises which have been included on the list of priority objects of financing in connection with special circumstances (the installation of new complex equipment, the partial halt of production for renovation and others). Meanwhile, the national economic impact from the assets, which are allocated for the retooling of various sectors, is not identical in the technological "chain" of the passage of raw materials and fuel from the extractive sectors to the sectors and works, which produce the final product. Weakest links exist, and they need the immediate renovation and modernization of production. These, in our opinion, are the following processes of the processing of raw materials and fuel in industry: petroleum refining, in which the output of light petroleum products is still relatively low; the blast furnace process with a larger consumption of coke as compared with the best foreign plants; the machining of metal in machine building with a significant output of cuttings due to the shortage of cast shapes and precision castings, light versions of rolled stock, sheet and other products, which are supplied by metallurgy, as well as special, especially strong plastics, which in many cases could replace metal; the hydrolytic processing of wood pulp at pulp and paper combines, where the output of paper from a specific amount of wood pulp

lags behind the indicators of foreign enterprises; the primary stages of the processing, canning, warehousing and storage of food products, in which a significant amount of agricultural raw materials is lost. In these sectors it is necessary to develop and introduce a system of a "closed" cycle with a waste-free processing method and with the complete recovery and reclaiming of waste products and byproducts.

The fulfillment of the decisions of the 25th and 26th CPSU Congresses on the increase of the share of the sectors, which produce the final product, is the main task of the structural policy for the future, and the priority allocation of assets for the renovation and modernization of the most resource-consuming processes, the primary stages of the processing of raw materials and the use of fuel will contribute to this. Of course, this structural policy should be combined, as has already been stated above, with the expansion of the output of economical machinery and equipment for all sectors of the national economy, with the change of the system of evaluations for the development of new equipment and with the improvement of the standard base and planning. Only in combination can all these conditions yield positive results, their realization separately or with an gap in time is ineffective.

Machine building, the rate of development of which and the quality of the products produced by it for the present are not properly satisfying the demands of the national economy, is the basis of technical progress. The tasks of the development of this sector as a whole are well known, they have been specified in the decisions of the congresses and plenums of our party--they are the increase of the quality of products, their greater output at the level of world standards, for which the introduction of a new technology of the machining of metal is necessary, the updating of the stock of machine tools, the output and assimilation of new machine tools (especially precision machine tools, multipurpose machine tools, machine tools with programmed control, machine tools with integrated circuits, robots and so on), the increase of the level of specialization, the changeover of many enterprises to a continuous flow production process, but with the quickest possible readjustment of production for products which are first of all needed by the national economy at the present stage.

Tool production, the making of accessories and fasteners, as well as the increasing amounts of internal repair due to the low level of the unification and standardization of the stock and the large amount of different-type equipment are one of the greatest bottlenecks in machine building. Therefore, an important task of the development of machine building is the establishment of a specialized tool industry, in order to free plants from their own making of low quality tools, which influence the operating conditions, labor productivity and product quality, as well as modern, technically equipped repair firms which specialize in the overhaul and medium repair of a specific type of equipment.

The accomplishment of technical progress in the USSR national economy is being linked more and more with economic integration within the socialist camp. The CEMA member countries are taking part in reciprocal deliveries of machine building, chemical and other products, in the making up of complete sets of these products and the joint construction of production facilities.

All these progressive forms of scientific and technical cooperation will be expanded. It is necessary to make it closer: in the fulfillment of comprehensive scientific and technical goal programs, in the development of new processing methods, especially energy- and fuel-saving technological processes, in which the GDR, Hungary and the CSSR already have abundant experience; in the joint working of mineral deposits, in which the socially necessary expenditures in the USSR are constantly increasing; in deliveries to our country of special equipment which is designed for extreme operating conditions; in the renovation and modernization of enterprises of a number of sectors of industry.

In the future socialist economic integration will be developed in the direction of the intensification of the international specialization and cooperation of production on the basis of the most advantageous division of labor in the output in each country of the products, for which especially favorable conditions from the point of view of the availability of material resources, skilled personnel, a scientific and technical reserve and so forth exist. In this case it is possible to proceed to the coordination and formulation of a structural and a scientific and technical policy, which is uniform for the socialist countries.

FOOTNOTES

1. The number of workers and employees in the national economy increased during the 8th Five-Year Plan by 13.3 million, during the 9th Five-Year Plan--by 12.0 million, while during the 10th Five-Year Plan--by only 10.3 million [2, p 399].

2. The incremental fuel-output ratio of the national income, which was calculated by us as the ratio of the increase of the production of all types of fuel to the increase of the physical amount of the produced national income, came to: 2.647 tons of conventional fuel per 1,000 rubles during 1966-1970, 4.762 tons of conventional fuel per 1,000 rubles during 1971-1975 and 3.279 tons of conventional fuel per 1,000 rubles during 1976-1980 [2, p 181].

3. Calculated according to [2, pp 68, 315, 399, 417; 3, p 533].

4. The retirement of old capital in 1970 in industry came to 1.8 percent of its availability, while in 1981 it came to 1.3 percent [2, p 175; 3, p 169].

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CONTRIBUTION OF TECHNICAL COMMUNITY TO SCIENTIFIC, TECHNICAL PROGRESS

Riga KOMMUNIST SOVETSKOY LATVII in Russian No 8, Aug 84 pp 41-47

[Article by V. Aleksyev, chief of the Department of Science, Technology and Foreign Relations of the Administration of Affairs of the Latvian SSR Council of Ministers: "Scientific and Technical Progress and the Technical Creativity of the Masses"]

[Text] Our party is devoting constant attention to the questions of the acceleration of scientific and technical progress as one of the decisive factors of the successful development of the national economy and the increase of the efficiency of the economy.

K. U. Chernenko stressed the extraordinary importance of this task in a speech at a meeting with the workers of the Moscow Serp i molot Metallurgical Plant. "The retooling of sectors and the introduction of the latest achievements of science and advanced know-how," he said, "are acquiring particular importance at the present stage. This is an urgent requirement of the times, it can be said, a command of the era."

Specific tasks in this area are specified in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy," which was adopted last year, and in the materials of the December (1983) and February (1984) CPSU Central Committee Plenums.

The radical improvement of the work on the acceleration of scientific and technical progress should be accomplished on the basis of the consistent pursuit of a uniform scientific and technical policy, the further development of research, the intensification of the integration of science and production and the extensive and rapid introduction in practice of the achievements of science, technology and advanced know-how. A conspicuous role in the accomplishment of these tasks also belongs to our technical community, efficiency experts and inventors.

The technical community, efficiency experts and inventors of the Latvian SSR are making a significant contribution to the improvement of social production and the increase of labor productivity. In 1983 more than 60,000 inventions and efficiency proposals with an economic impact of 117 million rubles were

introduced at enterprises of the republic. First place in the All-Union Competition was awarded to the Latvian SSR in accordance with the results of the work in the area of rationalization and invention during 1983. The collectives of inventors and efficiency experts of the ministries of agriculture, the food and light industries and motor transport and highways made an appreciable contribution to the achievement of this gain. Much work is being performed at the VEF, Rizhskiy elektromashinostroitel'nyy zavod and Al'fa production associations, other enterprises and organizations of the republic.

At the same time there are many shortcomings, difficulties and unsolved problems in the work which is aimed at the development of mass technical creativity. Adequate attention is being devoted to the movement of inventors and efficiency experts not in all the sectors of the national economy and not at all enterprises and organizations. If only the fact that in a number of sectors, for example, at enterprises of light and the electronics industries and consumer services, in 1983 as compared with the preceding year the basic indicators of the work on rationalization and invention worsened: the number of authors, the number of used proposals and the economic impact from their introduction decreased, attests to this. This was first of all a consequence of poor organizing work on the development of invention and rationalization in labor collectives, which is being performed by these departments and enterprises. They are analyzing inadequately the state of this work at the enterprises subordinate to them, are not taking the necessary steps for its stimulation and at times poorly study and generalize the work experience of the best collectives, inventors and efficiency experts.

The fact that in a number of cases the assets, which are being allocated in accordance with the plan of the financing of invention and rationalization and are intended for the development of prototypes, the preparation of technical specifications, the payment of a reward to the authors, the implementation of various organizational measures and, in the end, the technical improvement of production, are being used poorly, can also serve, obviously, as evidence of the still encountered inertia and inadequate interest in the development of technical creativity. In 1983, for example, only 6.1 million rubles of the 8.9 million rubles which were allocated for these purposes, which came to 68.5 percent, were used in the republic. The level of the use of the assets allocated for invention and rationalization was extremely low in the ministries of construction (59 percent), consumer services (56 percent) and land reclamation and water resources (45 percent). Meanwhile this is precisely the case when it does not pay to skimp. Practical experience shows that the assets, which are allocated for such purposes, are quickly rewarded: it has been calculated that every ruble, which is spent on the development of invention and rationalization, turns into a saving of 17 rubles.

The possibilities of the enlistment of the broad masses in the technical creativity of the organization of the All-Union Society of Inventors and Efficiency Experts are not been fully utilized. The councils of the All-Union Society of Inventors and Efficiency Experts in a number of cases have relaxed public control over the activity in this area.

Ministries and departments, enterprises and organizations and public formations have to do much for the increase of the effectiveness of the work on efficiency promotion and invention. For it is no secret that at times it suffers from the study of minor themes, is of a random nature and is dispersed among a large number of directions, including secondary directions. It is necessary to see to it that the cardinal, key problems of production would be at the center of attention of inventors and efficiency experts, that such themes, the elaboration of which is capable of providing the greatest economic impact and of creating reliable prerequisites for the increase of labor productivity, the saving of energy, material and manpower resources and the use of fundamentally new processing methods, would be included in the creative obligations of innovators, inventors and efficiency experts.

Operations, which do not have the proper influence on the accomplishment of the basic tasks connected with scientific and technical progress in the sector, are frequently included in the thematic plans of scientific research, planning and design and technological organizations. Unfortunately, the study of minor themes is very tenacious. Such themes are financed more simply, are elaborated and introduced more rapidly, but, as a rule, involve the partial improvement of existing equipment and technology. It is a bad thing if they hold leading positions in the plan of an institution to the detriment of themes which are major with respect to importance and the impact. Unfortunately, only a portion of the scientific research, planning and design and technological institutions of the republic are purposefully and effectively performing work on the development and introduction of new means of mechanization and automation and new types of items and technological processes. Frequently the operations are planned without consideration of the demand for them on the part of enterprises and the anticipated economic impact from their introduction. The novelty of many scientific and technical decisions is inadequate, to which the fact that only 3 percent of the developments being introduced contain inventions per se, attests. In spite of the fact that in the past decade the army of planners, designers and associates of the scientific research institutes in the republic has grown, the time of the development of new equipment in practice is not decreasing.

For the purpose of eliminating these shortcomings the councils of scientific and technical societies and the primary organizations should influence more actively the formulation of the plans of work of scientific research, planning and design and technological organizations, by making their own recommendations, which are aimed at the improvement and extension of the themes, and should exercise public control over the implementation of these plans.

State comprehensive goal programs act as an effective means of accelerating scientific and technical progress and of pursuing an uniform scientific and technical policy. They conform completely to the task posed by the party--to combine the achievements of the scientific and technical revolution with the advantages of socialism, make it possible to put to use in a planned manner the still untapped reserves and open a broad field of activity for innovators, inventors and efficiency experts.

The comprehensive program "The Decrease of the Use of Manual Labor in Industry and Other Sectors of the National Economy of the Latvian SSR for 1981-1985," for example, is of the greatest economic and social importance.

The implementation of the measures of this program made it possible in 3 years of the current five-year plan to free 18,000 people from manual labor and to facilitate labor for a significant number of people who work under adverse conditions. However, considerable efforts still have to be exerted in this direction.

The task of formulating all-union programs of operations in the area of the development of versatile automated production systems and automated designing systems is posed in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy." The necessity of implementing such programs is dictated by the very logic of the development of modern production and scientific and technical progress. The point is that now our industry cannot be oriented toward the output of similar products for a long period: items, which just yesterday seemed a miracle of technology, tomorrow will become ordinary or will become obsolete altogether. The need to update products more often and to change rapidly the plans of production requires the changeover to versatile automated production systems. Automated designing systems are one of the most important directions of the automation of engineering labor. However, only the first steps are yet being taken here in this direction. And here the great possibilities in the activity of inventors, efficiency experts and the entire technical community are also being revealed.

The questions, which are connected with the development and use of technical innovations which are aimed at the saving of material, fuel and energy resources and the decrease of the materials-output ratio of products, should daily be at the center of attention of the organizations of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies.

The work on the development of the production of consumers goods on the basis of the extensive use of modern equipment and technology needs serious improvement. The plenum of the Latvian Republic Council of Scientific and Technical Societies, which was held in April, was devoted to the increase of the role of the scientific and technical community in the development of the production of consumer goods. As the participants in the discussion indicated, the creative potential of collectives is still not being used at all enterprises with sufficient activeness. This pertains first of all to the Liyepaysel'mash Plant, the RAF Microbus Works imeni XXV s"yezda KPSS, the Riga Diesel Building Plant, the Riga Plant of Hydrometeorological Instruments and the Riga Plant of Reinforced Concrete Components of the Baltmorgidrostroy Trust, which did not fulfill the plans of the output of consumer goods per ruble of the wage fund. The organizations of the scientific and technical societies of light, the chemical, paper and wood processing industries were seriously criticized for the low level of the work on the increase of the quality of consumer goods.

As before there are many unsolved problems in construction. At many construction projects in the republic the efficient organization of labor is absent, the level of mechanization is low, equipment and transport are being used inefficiently, low work quality is being permitted. The scientific and technical society of the construction industry needs to examine more vigorously the problems, which are hindering the highly productive operation of the construction conveyor, and to prepare proposals on the establishment of the proper order.

It also seems expedient that the organizations of the scientific and technical societies would specify specific projects for the giving of patronage assistance in the renovation and modernization of production. In this connection it is necessary to hold more extensively public appraisals of the plans of the retooling and renovation of operating enterprises and to formulate practical recommendations on the increase of their technical level.

Measures connected with the Food Program should hold one of the important places in the activity of inventors and efficiency experts and the scientific and technical community. The Republic Council of Scientific and Technical Societies jointly with the scientific and technical society of agriculture has drafted a plan of measures on the promotion of the implementation of the Food Program. During the accomplishment of this task closer contacts are being established between the technical community of different sectors. Thus, last year the republic boards of the scientific and technical societies of motor transport and agriculture jointly held a seminar on the theme "The Introduction of the Centralized Management of Truck Transport During the Period of the Harvesting of the Crop and the Procurement of Fodders," at which the sharing of advanced know-how of the organization of labor took place and recommendations on its improvement were formulated.

The organizing work, which is aimed at the stepping up of the creative research of inventors and efficiency experts, also needs further improvement. Among the most prevalent forms of this work is the holding of thematic reviews and contests. Precisely they should attract the attention of innovators to key problems and should serve as a means of combating the study of minor themes. The sectorial councils, sections and primary organizations of the scientific and technical societies and of the All-Union Society of Inventors and Efficiency Experts annually implement a significant number of similar measures. As a whole they undoubtedly are of considerable use, valuable suggestions originate during them. At the same time the organization and the conditions of a certain portion of the reviews and contests are inadequately thought out, in a number of cases they duplicate each other, which decreases appreciably their effectiveness and efficiency.

The conditions of socialist competition should also orient inventors and efficiency experts toward the accomplishment of the most important national economic tasks. In the decree of the CPSU Central Committee "On the Improvement of the Organization and the Practice of the Tallying of the Results of Socialist Competition and the Stimulation of Its Winners," which was published in September 1983, the acceleration of scientific and technical progress is named among the most important directions of labor competition at the present stage. In this connection it is necessary to encourage in every

possible way the technical creativity and initiative of every member of the labor collective.

All specialists should be involved in competition on the basis of personal and collective creative plans. The fulfillment of measures on the technical improvement of production should be included as a component in the socialist obligations of enterprises and organizations, their structural subdivisions, brigades and individual workers. The conditions of the competition and its indicators should be clear and precise and should be aimed at the achievement of high end results.

Perhaps the most difficult and urgent problems in the development of mass technical creativity are connected with the introduction of the developments of innovators in production. It is well known how many obstacles arise at times in the way of innovations, inventions and efficiency proposals and how often their authors have occasion to be faced with bureaucracy, red tape and the lack of proper interest.

The organizations of the All-Union Society of Inventors and Efficiency Experts are performing definite work, which is aimed at the giving of assistance to innovators in the quickest possible use of their developments in practice. Thus, public control over the introduction of 57 inventions with an anticipated saving of more than 3 billion rubles has been established by the sectorial councils and sections. The Republic Council of the All-Union Society of Inventors and Efficiency Experts is exercising direct control over the realization of a set of inventions, on the basis of which a pilot industrial enterprise is being built in Zilayskalns for the obtaining of molasses and nutrient yield from peat.

Ministries and departments jointly with the organizations of the All-Union Society of Inventors and Efficiency Experts have begun to envisage to a greater extent the use of inventions in the plans of new equipment.

For the purpose of the quickest possible introduction of new developments in production the closer cooperation of various public formations in labor collectives--the organizations of the All-Union Society of Inventors and Efficiency Experts, scientific and technical societies, permanent production conferences--should be sought. It is recommended to place on the agenda of such conferences, for example, the results of the "inventories" made by the councils of the All-Union Society of Inventors and Efficiency Experts of the proposals, which have not been used in production, to discuss jointly the causes of this, to seek efficient means of their introduction and to give assistance to the inventors and efficiency experts, who are working on the implementation of thematic plans. The practice of the conclusion of contracts for the development and introduction of specific technical innovations between the administration and creative collectives should be expanded in every possible way, the effective monitoring of their fulfillment should be implemented.

Such associations as creative multiple-skill brigades and public design and patent bureaus are capable of effectively promoting the quickest possible introduction of developments, technical innovations, inventions and efficiency

proposals. Some work is being performed in this direction. Creative brigades of inventors and efficiency experts are operating successfully, for example, at the VEF, Al'fa, Rizhskiy elektromashinostroitel'nyy zavod, Rigas manufaktura, Dzintars and Radiotekhnika production associations, the Biokhimreaktiv Scientific Production Association, the Straume and Rigakhimmash plants, the Slokskiy Pulp and Paper Plant, the Riga Light Bulb Plant and other enterprises.

For example, the creative brigade at the Al'fa Production Association, which unites 39 specialists from different subdivisions, is working on important tasks. At the Biokhimreaktiv Scientific Production Association creative collectives are set up for each new theme. While three creative multiple-skill special-purpose brigades were formed for the development of preparations of nucleases. One of them, which is managed by Ligita Orna, was victorious in the republic competition of creative Komsomol-youth collectives. Many of the creative brigades in fact are implementing the important principle "Engineer's Support for the Worker's Initiative."

However, we also have many such public formations, which only exist on paper, but in practice are not in operation. The composition of some of them is random, others consists of only two people, but in the reports of enterprises are stubbornly called multiple-skill creative formations.

Frequently inventors need assistance in the proper drawing up of applications for certificates of authorship, which should be drawn up strictly in accordance with form, with the scrupulous observance of a large number of requirements. The specially established consultation centers are called upon to give such assistance to innovators. I believe that for the most part they are coping with this. But in another matter--the observance of the right of the authors to a reward--far from everything here is satisfactory. Frequently the enterprises, which use an innovation, incorrectly calculate the economic impact, delay the payment of rewards and, it happens, completely hide the fact of the use of an invention. In such cases the organizations of the All-Union Society of Inventors and Efficiency Experts should come out more actively in defense of the interests of innovators.

The inactive attitude of the managers of a number of enterprises and organizations toward the developments of innovators in many ways is explained by their inadequate interest in the introduction of the achievements of science, technology and advanced know-how. The decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy" outlines means of eliminating such a situation. A number of economic and organizational measures, which promote the increase of the interest of enterprises in the use of the achievements of scientific and technical progress, are envisaged by it. It is established by the decree that the fulfillment of the plans and assignments on the development of science and technology are included among the most important indicators, according to which first of all the evaluation of the results of the economic activity of associations (enterprises) is made, and the results of the socialist competition are also tallied. In case of the nonfulfillment of these assignments, as well as the output of products after the expiration of the standard period of their updating (modernization) the

bonuses for the managerial personnel of associations (enterprises) for the basic results of economic activity are reduced by not less than 25 percent. The USSR State Committee for Prices is given the right to establish incentive markups in the amount of up to 30 percent on the wholesale prices and reductions in the amount of up to 30 percent on the wholesale prices for industrial products, which are to be removed from production. An additional material incentive for engineering and technical personnel for the development and introduction of new equipment and the improvement of the management of scientific and technical progress is being established. A number of organizational measures, including the establishment of temporary collectives for the solution of especially important problems of scientific and technical progress, are also envisaged. It is necessary to implement the opportunities, which are afforded by the decree, without delay in [as published].

The technical creativity of the masses and the movement of inventors and efficiency experts are one of the forms of the participation of the workers in production management. A significant place in this work is being assigned to the organizations of the All-Union Society of Inventors and Efficiency Experts. Their efforts should be aimed at the creation in every labor collective of an atmosphere of genuine creative research, labor competitiveness and comradely mutual assistance, great responsibility for the assigned job and intolerance toward shortcomings. The organizations of the All-Union Society of Inventors and Efficiency Experts are called upon to take a most active part in the drafting and the discussion by labor collectives of the plans of economic and social development and in the organization of their fulfillment.

The tasks on the acceleration of scientific and technical progress and the introduction of its achievements in practice and production, which at the present stage face our national economy and every labor collective, are great. The efforts of scientific and technical societies and the All-Union Society of Inventors and Efficiency Experts, the entire technical community, innovators, inventors and efficiency experts should also be aimed at their fulfillment.

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COORDINATION OF REGIONAL MANAGEMENT OF SCIENTIFIC, TECHNICAL ACTIVITY

Moscow PRAVDA in Russian 22 Oct 84 p 3

[Article by Candidate of Economic Sciences V. Kvint (Moscow): "The Region and the Sector: Means of Cooperation"]

> [Text] In Siberia the Minusinsk Electrical Equipment Complex is gaining strength. The production of automatic machine tools for the plasma cutting of metal and components of warehouse processing methods has been assimilated at one of its plants. Both free labor. The production of this equipment is more expensive here than, say, in the Ukraine. But the user is as if next door--giant Siberian plants. However, they ship an overwhelming portion of it to the European regions of the country--considerations of a sectorial nature had an effect.

During the present period of qualitative changes in the productive forces of the country the unified scientific and technical policy is acquiring especially great importance. Its main task is the choice of promising directions and the priorities in the development of science and technology and the large-scale introduction of their achievements.

Practical experience has demonstrated that the solution of these problems requires the unification of the efforts of economists, sociologists, technologists, political scientists, lawyers and other specialists. At the same time the unified scientific and technical policy is most effective precisely when it has been thoroughly studied not only in the statewide context, but also in both the sectorial and the regional contexts, when it is interconnected with the entire mechanism of the management of the national economy.

In conformity with the decisions of the 26th CPSU Congress and the April (1984) CPSU Central Committee Plenum the system of the management of the national economy is being thoroughly improved and a search for new forms and structures of economic activity is under way. And here, in our opinion, the rationalization of not only the statewide and sectorial systems of management, but also the regional systems is also important. The management of scientific and technical progress should be organized with allowance made for the

differences in the level of the economic development of regions and the nature of their social, climatic and other conditions.

The set of planning and accounting indicators of the effectiveness of scientific and technical progress should reflect and take into account the conditions of the use of new processing methods and machines in different zones of the country. This will promote not only the increase of the actual (and not the conditional) efficiency of new equipment. Economic barriers will appear in the way of the processing methods, the use of which threatens the natural environment of the region.

As is known, large-scale experiments, which are aimed at the broadening of the possibilities of production associations and enterprises in the planning and management of economic activity and at the increase of their responsibility for the results of work, are now being conducted in the country. The realization of these progressive aims, so it seems, will also reveal new possibilities of the cooperation of enterprises of different departmental subordination, which operate at one industrial center or another. Under these conditions the role of territorial organs in the coordination of the work of these enterprises and the establishment of their cooperation will inevitably increase.

In this sense the activity of the regional scientific centers of the Academy of Sciences of the Ukraine is of interest. They coordinate the work of not only academic, but also sectorial scientific institutions in the region. The Leningrad Scientific Center of the USSR Academy of Sciences, to which the scientific supervision of the territorial-sectorial program of the intensification of the economy of the oblast for 1985 and the 12th Five-Year Plan has been assigned, is organizing its activity in the same way. The CPSU Central Committee endorsed the initiative of the Leningrad Oblast Party Organization on the elaboration of the program "Intensification-90" and recommended to the State Planning Committee, the USSR State Committee for Science and Technology, the Academy of Sciences and ministries to study and disseminate extensively this experience.

As is known, several years ago the Siberian Department of the USSR Academy of Sciences prepared the large-scale regional scientific research program "Siberia." This year the program has been changed qualitatively. Its assignments were submitted for approval to the State Planning Committee of the country, the RSFSR Council of Ministers, 60 ministries and departments and 350 research, design and planning organs, which are taking part in it. After this the USSR State Committee for Science and Technology together with the Presidium of the USSR Academy of Sciences adopted a decree, which gave the "Siberia" program a constitutional law status.

However, the centers of academic sciences have become far from everywhere directly regional scientific centers, which consolidate and coordinate the work of all scientific and planning institutions, regardless of their departmental subordination. Thus, the research and planning and design organizations of several union instrument making and machine building ministries make up a significant proportion in the scientific and technical potential of Lithuania. Located at times on the same street, these

organizations are poorly informed about the work of each other, in a number of instances conduct parallel research and do not have sufficiently effective cooperation with each other. They also do not have sufficiently reliable contacts with the corresponding institutes of the republic academy.

In our country the role of the soviets in economic development, the fulfillment of the state plans and the increase of the efficiency of socialist production is gradually increasing. It is clear that this also presumes the increase of the role of territorial organs in the management of scientific and technical progress. However, in the corresponding procedural materials, which were prepared by the State Planning Committee of the country, the questions of the management of scientific and technical progress have been completely overlooked in the list of functions of territorial organs, particularly kray and oblast organs.

Here, for example, in Krasnoyarsk alongside the collective of many thousands of Sibtsvetmetavtomatika [not further identified] there exists the weak affiliate of Soyuztsvetmetavtomatika [not further identified] of the same USSR Ministry of Nonferrous Metallurgy. As a result the use of production capacities is worsening, an excessive management staff is being maintained, the neighbors are enticing workers from each other. Here it would be just the right time for the territorial organs of management to intervene.

It seems to us that it would be advisable to supplement the economic experiments being conducted in the country with such an experiment, which would make it possible to evaluate and analyze the pluses and minuses of the establishment of organs of the management of scientific and technical progress in regions, to develop their efficient organizational structure and to substantiate the group of economic functions and the sphere of responsibility. In accordance with its results it would be possible to prepare recommendations, which are aimed at extending the combination of the territorial and the sectorial approaches to the management of the national economy as a whole.

The unified state scientific and technical policy is dynamic. The change and improvement of individual components, "blocks" of the economic mechanism and of the outlines of this policy reflect its constant evolution--the result of the progressive development of the socioeconomic relations of mature socialist society.

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CONTRIBUTION OF SOCIAL SCIENCES TO SCIENTIFIC, TECHNICAL PROGRESS

Moscow PRAVDA in Russian 24 Sep 84 p 3

[Article by PRAVDA special correspondents V. Gerasimov and S. Kolesnikov (Leningrad): "Facing Practice"]

[Text] A decisive turn toward the real, practical tasks which life poses--that is how the June (1983) CPSU Central Committee Plenum defined the strategy of the work of social scientists. Much had already been done in the time which has passed since the plenum. Monographs on the urgent problems of mature socialism are being published, the means of increasing the efficiency of production and communist education are being studied. But still the turn toward practice for the present is not yet proceeding as rapidly and effectively as is specified by the party decisions.

When at one of the Leningrad enterprises they began the elaboration of a comprehensive goal program of socioeconomic development, they turned to university social scientists. The latter responded willingly. An entire brigade: sociologists, economists, came to the Vyborg side.

The production workers had a specific request: to formulate a number of indicators of social development, which previously "were not entered" in the plans. Such indicators, for example, as the level of the creative atmosphere in the collective or the public activeness of workers.

The "fitting" of the brigade of scientists to the demands of the experienced workers proceeded with difficulty. At first the guests demanded from the board of directors and the party committee numerous reports. Of course, they did not give them such reports, having recommended that they themselves plunge into the thick of the life of the collective and study it not from documents, but directly on the job. The scientists began to go more often to the shops and laboratories and to talk with people and conducted a detailed survey. However, the first results of the study did not satisfy the clients. They needed not a description of practice, but its specific analysis on the basis of theory and practical recommendations. But, what is the most important thing, the social scientists and engineers began to speak a common language

and realized their mutual usefulness. And hence there will also be the continuation of cooperation.

Many of the problems of the occurring reorientation of social science research were clearly reflected in this incident. Scientists are not always ready to react properly to the requests of production. Experienced workers often do not ponder enlisting social scientists in the solution of their problems and helping them to translate theoretical computations into the language of specific actions. However, the need for this is clearly sensed on both sides. The workers of the plant, so to speak, had gotten used to the level of their production and the forms of the life of the collective. A fresh view is needed--such is the opinion of not only the production workers, but also the Vyborgskiy Rayon Party Committee, on whose initiative the business cooperation with social scientists was begun.

In Leningrad there are many examples of the practical return of the research of "humanitarians." For the second year the Chair of Political Economy of the Leningrad Electrical Engineering Institute imeni V. I. Ul'yanov (Lenin) is performing work in accordance with an economic contract with the Leningrad Industrial Knitwear Association. Recommendations on the increase of the efficiency of the brigade forms of the organization and stimulation of labor at the knitting works are being elaborated.

Scientists of the Institute of Socioeconomic Problems of the USSR Academy of Sciences and the chairs of a number of Leningrad higher educational institutions have received special-purpose assignments on the "theoretical support" of the large-scale economic experiment, in which a number of enterprises of the city are participating. The contribution of social scientists to the implementation of the territorial-sectorial program of the intensification of the economy on the basis of the acceleration of the introduction of scientific and technical achievements, the elaboration of which was recently endorsed by the CPSU Central Committee, should also become more significant.

Thus, the range of cooperation of social scientists with production and practice is quite broad. However, is it always possible to pose the task of elaborating practical recommendations? Of course, it is not always possible. There have been and will be works, which are devoted to fundamental problems. Studies, which are designed for specialists, are necessary--without such literature science cannot develop. And still the highest goal of scientific research is to give responses to the demands of society. For the practical return is the establishment of the novelty of phenomena of social life, the determination of their social content and the revelation of the regularities.

However, when leafing through tens and hundreds of pages of reports, articles and monographs, more often you all the same encounter obvious things and, if it is a question of new phenomena, recommendations like: "to continue the study of the question of...." In other words, in the developments of social scientists the specification of concepts and terms and the posing of questions, and not suggestions of new means are often in first place. Scientists also rarely ponder about bringing the results of research up to the necessary "technological" level. Practical recommendations at times are

unaddressed and are not oriented toward a specific "consumer." The accomplishment of these tasks requires of social scientists the formulation of applied generalizations, methods and experimental procedures of introduction. And, consequently, it presumes the closer cooperation of scientists with party, state and economic organs and labor collectives.

Unfortunately, for the present it is not the scientists who are seeking contacts with experienced workers, while the experienced workers, "clients" themselves--of course, the most active, competent ones--are asking for assistance and are giving a stimulus to interesting developments. In many plans of chairs the themes, which are connected first of all with the personal, "dissertation" interests of some scientists or others, are called "resourceful." But it would be a good thing to return to this word its true meaning.

We are not about, of course, to absolutize the applied nature of social science research. In a conversation with I. Sigov, director of the Institute of Socioeconomic Problems of the USSR Academy of Sciences, we recalled the well-known truth about the practicality of a good theory.

Take if only the problems of the brigade contract. Many methods of introducing the brigade form of the organization and stimulation of labor exist. But for the present there is no general concept, theory. Is it not here that the difficulties of its introduction are rooted? Or such a question which arose in connection with the participation of a number of Leningrad enterprises in the economic experiment. In each sector its own, in many ways dissimilar methods of calculating the production cost are in effect. But the reason frequently lies in the lack of coordination of the approaches to this problem in political economic theory. Thus, without having settled the general questions, one invariably has to run into them when settling particular questions.

For the present the scientific and theoretical level of research is also low. In the past year and a half the RSFSR State Committee for Publishing Houses, Printing Plants and the Book Trade rejected 21 works on social disciplines of those which had been recommended for publication by chairs of Leningrad University and the Northwestern Coordinating Council of the republic Ministry of Higher and Secondary Specialized Education. While behind this figure is the inaccurate choice of the theme of the study, and at times methodological and organizational miscalculations. The themes of doctoral dissertations, for example, are frequently duplicated. Thus, in the city six degree seekers are elaborating at the same time the problems of the dynamics of manpower and its efficient use under socialism. At the same time such urgent directions as scientific pricing and several others, which were specified by the decisions of the June Plenum, have remained outside the field of view of scientists.

Practical experience shows that significant reserves of the increase of the efficiency of the social sciences are incorporated in the skillful organization of research developments and the concentration of the efforts of scientists on the key problems of the socioeconomic development of the country. In the decree of the CPSU Central Committee "On Increasing the Role of the Institute of Economics of the USSR Academy of Sciences in the

Elaboration of the Key Questions of the Economic Theory of Mature Socialism" not only are the basic directions of scientific research and steps on the increase of its quality outlined, but the precise specification of the ultimate goals of developments, the forms of approval and the time of their introduction in practice are also envisaged.

Thus, extensive possibilities have been created for the strengthening of the tie of research with the demands of society, the utmost strengthening of the planning principles of scientific activity and, finally, its regional specialization.

To a certain extent such work is being performed. The research of Leningrad philosophers, who analyzed the most complicated problems of knowledge and the dialectics of movement and development, has received all-union recognition. A generalizing work in five books "Teoriya materialisticheskoy dialektiki" [The Theory of Materialistic Dialectics] is being published on the basis of the philosophical institutions of the city. Political economists, historians and sociologists also have achievements. Useful elaborations of the problems and prospects of the development of large cities and of the changes in the nature and content of the labor of workers at the stage of mature socialism have been carried out at the academy's Institute of Socioeconomic Problems. Moreover, such authoritative organizations as the USSR State Planning Committee, the All-Union Central Council of Trade Unions and planning organs of the city and oblast act here as the clients.

And yet the possibilities, which are connected with the better organization of the matter, are still being used inadequately. This is connected first of all with the "departmental" isolation of social scientists, which has already become customary. For the most part they work at chairs of higher educational institutions.

How is one to achieve the optimum combination of the scientific potential of higher educational institutions and the academy?

"For this purpose," G. Vorontsov, prorector of Leningrad State University, relates, "after the June (1983) CPSU Central Committee Plenum on the initiative of the Leningrad Oblast and City Party Committees and the RSFSR Ministry of Higher and Secondary Specialized Education a department of the scientific council of the Academy of Sciences for the complex problem "The Economic Laws of the Development of Socialism and the Competition of the Two Systems" was organized. As a result the forces of the scientists of the chairs of political economy of the higher educational institutions of the region and the Leningrad Scientific Center of the USSR Academy of Sciences were united."

Time will show the effectiveness of such an association. But, it seems, it is already necessary today to establish the closer cooperation of not only political economists, but also representatives of other social sciences, regardless of "departmental affiliation." And here the role of the Leningrad Academic Scientific Center as the main coordinating organization should increase.

The overcoming of isolation also concerns the work on the orders of specific departments. Many scientists continue to work in the old way, confining themselves to the framework of the traditionally established specialization. Hence, it is necessary to overcome not only the barrier between science and practice, but also "interdisciplinary" barriers and to set up special-purpose combined research groups.

Another question is personnel. It cannot be said that there are not enough specialists in the field of the social sciences. Perhaps, the faculties and graduate studies of Leningrad State University and other higher educational institutions of the city are graduating them even in abundance. However, the quality of training does not always conform to the present criteria. Instruction is carried out at times in isolation of the topical needs of life. The problems of practice and the connection with the present "are disappearing" from many special courses. One graduate student in two in the specialty "scientific communism" and "political economy" completes his studies without having submitted a candidate dissertation for defense. The oblast and city party committees are now actively studying these and many other problems of the improvement of the teaching of social science subjects and the training of specialists.

A little more than a year has passed since the June Plenum of the party Central Committee. The period is comparatively short. But it is already sufficient for the means of reorganizing the work of social scientists to be specified. Today they are at a turning point.

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TASKS OF MEDICAL, BIOLOGICAL SCIENCES DEPARTMENT OF MEDICAL ACADEMY

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 10, Oct 84 (manuscript received 21 Feb 84) pp 11-14

[Article by A. V. Smol'yannikov (Moscow): "The Tasks of the Medical and Biological Sciences Department of the USSR Academy of Medical Sciences in Light of the Decisions of the June (1983) CPSU Central Committee Plenum"]

[Text] The scientists of the Medical and Biological Sciences Department of the USSR Academy of Medical Sciences, like all the Soviet people, unanimously approved of the decisions of the June (1983) CPSU Central Committee Plenum.

The institutes, which are a part of our department, are called upon to develop the theoretical medical and biological sciences, which are the bases of practical medicine, as well as to elaborate the questions of applied research which has a direct outlet to medical practice.

The need for a resolute turn toward the actual, practical tasks, which life is posing for our society, and the need for a change in the style of work and the combating of formalism in the system of political education were stressed at the June Plenum. This principle has also become the guiding feature in the activity of our department.

By 1 October 1983 the plans of scientific research work for 1984 had been reviewed by all the institutes of the departments. The further improvement of ideological, political educational and scientific methodological work, the intensification of the campaign against ideologically alien trends and the closest coordination of ideological work with the immediate tasks of the institutions are envisaged; the need for the increase of labor productivity and the level of scientific research, the broadening of the front of basic work, as well as comprehensive and applied research, which is directly connected with the demands of clinical medicine and practical health care and would contribute to the development of effective methods and means of the diagnosis, treatment and prevention of diseases and to the training of highly skilled and ideologically highly educated personnel, was indicated.

Plans of the holding of scientific methodological conferences, which are devoted to the leading directions of research of the institutes (laboratories), have been drawn up at all the institutions of the department,

at a number of institutes they will be held with the attraction of specialists who are philosophers. The promotion abroad of the achievements of the Soviet socialist system and the successes of domestic science, the enlistment of prominent scientists, who are veterans of science, in the ideological and patriotic training of young scientists and in socially useful labor and the constant striving for the fulfillment of their duty to society are included in the tasks and plans of ideological work.

In 1984 it is planned to hold a scientific methodological conference of the Medical and Biological Sciences Department of the USSR Academy of Medical Sciences on the theme: "The Methodological Aspects of Basic Research: The General Theoretical and Applied Significance."

The questions of the increase of the level of methodological work, the improvement of its forms, the elaboration of basic and theoretical problems, scientific methodological research and its connection with the clinic and with the tasks of practical health care were covered at the session of the department in the report of the academician secretary and the coreports of the directors of the institutions. The results of the work already performed were reported and the measures, which have been planned for the further fulfillment of the tasks posed by the 26th CPSU Congress and the subsequent CPSU Central Committee plenums, were announced.

Thus, the Institute of Medical Genetics of the USSR Academy of Medical Sciences by way of the preparation of an all-union program on the prevention of illness of the population for the period of 1986-1990 formulated a concept and developed a draft of a subprogram on the prevention of hereditary diseases, in which the introduction in practice of measures of the primary prevention of multifactor diseases, the increase of the effectiveness of medical hygiene consultation, the extensive introduction of the prenatal diagnosis of hereditary diseases, the study of neonates and the monitoring of the mutagenic danger of factors of the environment are envisaged. The institute will perform the functions of the Center for Medical Genetic Consultation, which coordinates the work of 80 medical genetic offices.

In the research of the Institute of Normal Physiology imeni P. K. Anokhin much attention is being devoted to an important social task--the protection of the health of man under the conditions of intense production activity. The work on this level is being performed at the base of the Khromatron Plant on the basis of the theory of functional systems, which was formulated by P. K. Anokhin. Practical results on the decrease of the illness rate with temporary disability and on the determination of groups of increased risk have already been obtained. A number of specific measures, which envisage the increase of the scale of this work and the substantiation of effective preventive recommendations, have been outlined at the institute; the special intersectorial laboratory "The Systems Physiology of Labor" has been set up.

At the Institute of Pharmacology of the USSR Academy of Medical Sciences much ideological and scientific methodological work is being performed in close connection with scientific research and production activity. The development of the neurochemical mechanisms of alcoholism and the study of the causes and the methods of combating it are being carried out, which already finds

reflection in procedural recommendations, collections and survey articles. For the needs of practical health care a number of compounds for the treatment of the syndrome of abstinence and the pathological addiction to alcohol have been turned over for clinical testing. The research will be conducted jointly with narcological clinics and plants of the USSR Ministry of the Medical Industry.

The questions of the methodology of experimental research find extensive reflection in the operations of the Scientific Research Laboratory of General Reanimatology of the USSR Academy of Medical Sciences. They are providing the most abundant material for the critique of modern idealistic conceptions about so-called life after death. The thorough elaboration of the problems of the prevention and therapy of terminal states and the study of hypoxic diseases of the brain, the pathogenesis and prevention of post-reanimation disease will be carried out at the laboratory, which is of enormous importance for the practice of clinical reanimatology in the country.

At the Institute of Human Morphology of the USSR Academy of Medical Sciences, as at other institutions, much attention is being devoted to questions of ideological and ideological educational work, especially with young people. The research on the study of the influence of extreme factors in case of work in special climatic zones under rigorous conditions is already yielding its results, which are being introduced in the practice of health care.

The conference of young scientists on the ideological and patriotic education of young people, which was held at the institute, had extensive repercussions. The holding of another such conference is being planned.

At the Institute of Experimental Endocrinology and Hormone Chemistry of the USSR Academy of Medical Sciences great importance is being attached to the increase of the quality of medical service by the further development of the specialized endocrinological service of the country; in this respect systematic assistance is being given to organs of health care. The research on the prevention of endocrinological diseases, especially diabetes, will be broadened significantly. The methods of the epidemiological and public health surveying of the population will be introduced more extensively.

In the plan of scientific methodological developments of the Institute of Experimental Medicine of the USSR Academy of Medical Sciences the studies of the neurophysiological mechanisms of thought processes and the code of mental activity are of great importance. These studies, which are being conducted on the conceptual basis of dialectical materialism, are acquiring greater and greater gnosiological importance. A number of collections of scientific methodological works have been prepared for printing at the institute. Scientific methodological conferences are being held. Having a large scientific potential, the institute is conducting research on a broad front on urgent theoretical and practical problems of modern medicine, which can also make a significant contribution to scientific methodological developments and at the same time will be of great applied importance.

The institutes of the department of the biochemical type will increase the pace of research in conformity with the decree of the CPSU Central Committee

and the USSR Council of Ministers of 24 June 1981, "On the Further Development of Physical Chemical Biology and Biotechnology and the Use of Their Achievements in Medicine, Agriculture and Industry."

New approaches for the intrauterine diagnosis of a number of hereditary metabolic diseases have been proposed by the Institute of Biological Medicine and Medical Chemistry of the USSR Academy of Medical Sciences; in conjunction with other institutions of the department new approaches to the therapy of hypertensive conditions and the improvement of cerebral blood circulation during the post-reanimation period will be developed.

The themes of the new, recently established Institute of Medical Enzymology of the USSR Academy of Medical Sciences are governed, on the one hand, by the fundamental problem "The Structure and Function of Enzymes" and, on the other, by the needs of practical health care and the need for the development of enzyme diagnostic tests and the obtaining of enzymes for the therapy of a number of diseases.

At the Institute of Experimental Pathology and Therapy of the USSR Academy of Medical Sciences much organizing work on the introduction of a union scale of diagnostic kits for the radioimmunological detection of steroid hormones will be carried out. The continuation of the study of malignant blood diseases in an experiment on monkeys and by the method of clinical identification in man in large contingents of the population is envisaged.

The development of international scientific ties in the form of the participation of Soviet scientists in international forums for the purpose of the promotion of the achievements of Soviet medical science, the combating of ideological opponents and counterpropaganda is acquiring particular importance under present conditions. Guided by the instructions of the June CPSU Central Committee Plenum that "life requires not simply the broadening of cooperation, but also the increase of its quality and effectiveness," the Medical and Biological Sciences Department will perform work on the further improvement of international cooperation, will analyze thoroughly the results of foreign business trips and will practice more extensively the discussion of their results at the meetings of the bureau of the department. A special subsection--the promotion of the achievements of Soviet science abroad--is being included in the scientific programs of specialists who are going abroad.

At the June Plenum it was indicated: "A struggle for the minds and hearts of billions of people on the planet is under way. And the future of mankind depends to no small degree on the outcome of this ideological struggle." Hence it is understandable how exceptionally important it is to be able to report in an understandable and convincing form the truth about socialist society and its advantages and about the peace-loving policy of the Soviet Union to the broadest popular masses throughout the world. It is no less important to skillfully expose mendacious, subversive imperialist propaganda. We need to work on the development of a well thought-out unified system of counterpropaganda--a dynamic and effective system.

Understanding all the responsibility of the tasks facing us, the scientists, executives and all the associates of the institutions of the Medical and

Biological Sciences Department of the USSR Academy of Medical Sciences are exerting every effort to fulfill these tasks honorably and to achieve new gains in ideological work, the thorough elaboration of the fundamental trends of science and the more complete meetings of the growing demands on the part of practical health care in the area of the prevention and treatment of diseases.

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ACCELERATION OF SCIENTIFIC, TECHNICAL PROGRESS IN MOLDAVIA

Kishinev KOMMUNIST MOLDAVII in Russian No 7, Jul 84 pp 83-86

[Article by Corresponding Member of the Moldavian SSR Academy of Sciences A. Andriyesh: "The Most Important Lever of Scientific and Technical Progress"]

[Text] Under present conditions the socioeconomic development of society is directly dependent on the accumulated and newly created scientific and technical potential and on the rate of the introduction of the achievements of scientists and engineers in production. Therefore the rapid implementation of the results of scientific research in the practice of economic and cultural development was called by the 26th CPSU Congress a decisive condition of the progress of social production and the all-round improvement of mature socialism. This was reemphasized in the decisions of the November (1982), June (1983) and subsequent CPSU Central Committee plenums and in the speeches of General Secretary of the CPSU Central Committee and Chairman of the Presidium of the USSR Supreme Soviet Comrade K. U. Chernenko.

The decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy," which was adopted in August 1983, is of decisive importance in the realization of these instructions of the party. It envisages an entire set of measures on the decisive improvement of all the work in this area. Production, scientific and planning organizations are faced with the task to proceed in their activity from the fact that in the next few years the output of machines, equipment, instruments, materials and other products, which conform in their technical and economic indicators of the highest world level, as well as the introduction of advanced processing methods and methods of the organization of production and, on this basis, the substantial increase of labor productivity in all the sectors of the national economy should be ensured by domestic industry.

The responsibility of ministries and departments for the scientific and technical reequipment of production and the meeting of the demand for high quality products has been increased. It is necessary to strengthen all the units which are connected with the development and introduction of new equipment--from the training of staffs of scientists and specialists, the rapid construction and technical equipment of pilot and experimental bases and works to the creation of reserves of capacities for the development and the

assimilation of the production of advanced types of equipment and materials. Starting in 1984, the certification of industrial products according to two categories--the highest and the first--is being introduced, and the products, which do not correspond to these categories, are liable to removal from production.

The new procedure of certification also presumes the making of the demands on the scientific product--on the development on the basis of scientific research of new materials, processing methods, instruments, machines and consumer goods--more exacting and the devoting of more attention to the seeking of means of increasing the efficiency of one's own labor, shortening the time of the entire "research-production" cycle and improving each unit of it.

The method of the goal program planning of scientific research is one of the important levers of the accomplishment of the indicated tasks and the acceleration of scientific and technical progress in general. It ensures, in particular, a systems approach to the accomplishment of such a complicated problem as the changeover of the economy to the path of intensive development on the basis of the drafting and fulfillment of comprehensive scientific and technical and national economic goal programs.

The use of the goal program method follows from the very logic of the development of science at the present stage, of which both the differentiation and the integration of individual branches of science are characteristic. This is also dictated by the need for the decrease of the expenditures on science. The point is that, as Academician B. M. Glushkov wrote, each step of the progress of science is achieved with greater and greater difficulty, at a higher and higher price. Thus, the increase during the past four decades in the world of quantitative knowledge by 3- to 4-fold was accompanied by an 8- to 10-fold increase of the amount of printed and manuscript information, a 15- to 20-fold increase of the number of people in science and a more than 100-fold increase of the allocations for science and the assimilation of its results. Therefore, today it is necessary to approach more demandingly the formation of the goals and methods of the conducting of research, ensuring the selection of the most urgent tasks with the optimum expenditures of human and material resources.

In recent years much work on the reform of the organization of scientific research, which is aimed at the strengthening of the centralized principles in planning and the improvement of the intersectorial cooperation and specialization of science and production, has been performed in the republic. The Republic Council for the Coordination of Intersectorial Scientific and Technical Problems, which engages in the formulation and implementation of comprehensive scientific and technical programs, has been established. In all 15 such programs were approved for the current five-year plan. The assignments on them are envisaged in the five-year plan and annual plans and are backed with the necessary limits on labor, financing and material and technical resources. They encompass such most important problems as the further study of the natural resources of Moldavia and their use, the elaboration of the biological principles of the adaptive system of agriculture under the conditions of its intensification and large-scale concentration, the development of new materials and processing methods, the improvement of the

management of economic and social processes and others. In all 13 programs solve in full or in part problems of the agroindustrial complex.

In 1983 14 scientific institutions of the Moldavian SSR Academy of Sciences, 6 higher educational institutions, 29 all-union and sectorial scientific research institutes, more than 80 scientific production and production associations, enterprises, planning institutes and other organizations took part in their fulfillment. Significant changes have occurred in the structure of the scientific subdivisions of the academy. In connection with the change and abolition of several directions of research more than half of them were reestablished or renamed. For example, the Section of Water Problems, in which all the scientific forces of the academy, which study problems of water, are concentrated and 10 interdepartmental laboratories are operating successfully, was formed in the Geography Department.

A republic system of the collective use of expensive and single-design scientific equipment, which was established on the basis of the Center of the Automation of Scientific Research and Metrology of the Moldavian SSR Academy of Sciences, is in operation. It made it possible to increase the labor efficiency of scientists and the degree of reliability of the obtained results, to speed up research and to increase the utilization ratio of scientific equipment by threefold and the group of people using it by sixfold. The supply of scientific institutions with modern instruments and equipment is steadily improving.

The scientific experimental base underwent further development. In recent years a specialized design bureau of solid-state electronics, a pilot experimental enterprise attached to the Institute of Chemistry and a department of instrument making and the automation of biological research attached to the Center of the Automation of Scientific Research and Metrology were formed at the academy. An experimental model of the Fitotron-1 complex for ecological research and the first section of the Fitotron-2 complex of the Biological Center of the academy have been placed into pilot operation, the construction of the Institute of Plant Genetics with a scientific experimental base and a greenhouse and hothouse complex of the Botanical Garden is being carried out.

All this played a decisive role in the formation of the goal program principle of planning and in the conducting of research, which contributed to the increase of its amounts and the improvement of the use of its results in practice. Thus, in 1983 the number of suggestions, which underwent pilot production tests, as well as introduced developments increased as compared with 1981 by more than twofold.

Among the things proposed by scientists and being used extensively in the national economy are an improved system of herbicides in the industrial technologies of the cultivation of corn, sunflowers and tobacco; a method of the intensification of fodder production and its changeover to an industrial base; a system of anti-erosion soil cultivation in regions which are susceptible to water erosion; new productive filters for water purification (they are used at facilities of municipal and industrial water supply, in drip irrigation systems). Methods of adaptive selection, which speed up the

selection process and combine the high productivity of strains and hybrids with their resistance to ecological stresses, and units for electric-spark alloying like the Elitron, the economic impact from the use of which exceeded 7 million rubles, were introduced.

The drafting of intersectorial scientific and technical programs made it possible to broaden significantly the front of the use of the results of scientific activity--not at individual enterprises, but in the sector as a whole. Last year, for example, this indicator came to 50 percent of the total number of introductions. The level of novelty of research and of inventing, patent and license work increased. In 1981-1983 the institutions, which were the performers of the programs, submitted to the USSR State Committee for Inventions and Discoveries 620 applications for proposed inventions and received 375 certificates of authorship. A license for the technology and the equipment of the electric processing of vegetable raw materials was sold by the Academy of Sciences, an agreement in accordance with them was concluded with four countries. Kuybyshev University patented in four countries the method of obtaining semiconductor plies in a long band. As a result of the scientific research work, which was performed in accordance with the programs, 206 monographs and collections were prepared for printing and were published. The socialist competition of the collectives of scientific research, planning, technological and design organizations, higher educational institutions, associations and enterprises for the fulfillment of their assignments is a significant stimulus in the implementation of the programs.

In 3 years of the 11th Five-Year Plan 46.7 million rubles, 40 percent of which was received from ministries, departments and enterprises of the republic in accordance with economic contracts, were spent on the operations on all the programs. The recorded economic impact from the use of the results of scientific research according to the incomplete data exceeded 100 million rubles.

As we see, the scientific organizational work on the concentration of the resources of science on the accomplishment of the most important national economic tasks, which is being performed on the basis of the goal program method, increased the efficiency of research and intensified the introduction of scientific achievements. But far from all the possibilities have yet been used in this matter.

The success of the formulation of intersectorial programs in many ways depends on the participation of ministries and departments in them. This is necessary first of all for the improvement of the financial support of research. Unfortunately, economic contracts for the performance of scientific research, experimental design and technological work on intersectorial scientific and technical problems are concluded mainly in accordance with the demands of enterprises, sectorial scientific research institutes and planning organizations. The ministries and departments, which along with scientific institutions should play a leading role in the implementation of the programs, for the present are taking an inadequate part in this work. And this does not make it possible to solve on time and at the proper level many problems of research and introduction. Many ministries and departments are not setting

for basic science tasks for the future, but confine themselves to minor, at times only secondary problems.

One should group with the shortcomings of the organizational structure of the scientific potential of Moldavia the lack with respect to a number of directions of institutes of the sectorial and academic type for the solution of problems which are extremely important for the republic. For example, regional scientific research on hydraulic engineering and reclamation problems is not being conducted. A gap between basic research and the experimental design work being performed at the plants of the republic is being felt in the area of electronics and instrument making. And we have much work to do in order to strengthen significantly the plant sector of science. The scientific experimental and pilot production base of a number of scientific institutions of the academy, especially those which are in charge of research on such problems as water resources, the geology of the republic and the storage of agricultural products, requires improvement.

The level of use of the certificates of authorship, which were obtained as a result of the fulfillment of intersectorial programs, is also insufficiently high. Thus, of the 375 certificates of authorship, which were obtained during 1981-1983, only 50 were used in 1983. The experience of Belorussia should be used more extensively for the better solution of the problems of introduction. This creates favorable conditions for the inclusion of large-scale sectorial or intersectorial developments in the state plan of economic and social development.

At present the activity of the Republic Council and its scientific councils for problems is aimed at the improvement of the work of all units, which will contribute to the increase of the effectiveness of scientific research and the more rapid implementation of the intersectorial scientific and technical programs.

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INTERNATIONAL GEOLOGICAL CONGRESS, SOVIET GEOLOGICAL ACHIEVEMENTS

Moscow NEDELYA in Russian No 31, 30 Jul-5 Aug 84 pp 2-3

[Interview with USSR Minister of Geology Yevgeniy Aleksandrovich Kozlovskiy by NEDELYA correspondent Artur Podnek: "Geology: A Look Ahead"; date and place not given]

[Text] The 27th session of the International Geological Congress is opening in Moscow. It will be held from 4 to 14 August. Geologists of the world have gathered in our country for the third time now. The preceding meetings were in Petersburg in 1897 and in Moscow in 1937. USSR Minister of Geology Professor Ye. A. Kozlovskiy, Lenin Prize winner and chairman of the Organizing Committee of this session of the congress, granted an interview to a NEDELYA correspondent.

[Question] Today everyone understands perfectly well that no one except geologists--scientists and experienced workers--can dispel the apprehensions, which are widespread in the world and are attributable to the threat of the depletion of mineral reserves. Only they can indicate the new sources of natural resources, which are capable of backing materially not only the present, but also the future needs of mankind. And therefore the present world forum of geologists is arousing extremely broad interest.

Yevgeniy Aleksandrovich, tell us, what tasks is this session of the congress setting for itself?

[Answer] In the past 20 years geology has become a global science. Whereas previously we dealt in practice with only the dry land, now we are dealing with both the dry land and the world ocean. The congress will summarize the study of the planet as a whole. Study by the latest methods and means. For example, by research from space and by means of the deep and ultradeep drilling of the surface of the earth. The means of developing geological sciences for the future will also be outlined. At the plenary meetings, in the work of the sections, as well as the intersection symposiums and colloquiums it is planned to discuss about 100 major scientific problems. The unusual diversity and imposing nature of the research being conducted--from the geochemistry of space and the knowledge of the most distant past of our

planet to the comprehensive study of mineral resources and modern geological processes, which are due to the economic activity of man--will be revealed in the papers and reports.

We are attaching great importance to the discussions which will take place at all levels of the congress The fact that more than 500 leading scientists of the world will supervise these discussions, is also contributing greatly, undoubtedly, to their authoritativeness. These are scientific leaders. I ask you to take note: the leading specialists found the opportunity to come here at the time when the season of field research is in progress. Here is what enormous interest there is in the meeting! Among them is a large group of Soviet scientists, who today are in the lead in a number of directions of the geological sciences.

The congress is scientific, but among the Soviet and foreign participants almost half are field geologists, there are also representatives of various firms and companies. Such a composition once again confirms the closest connection in geology of science and practice. Here I should note the special role of this connection for geologists of the member countries of the Council for Mutual Economic Assistance. We now have unified comprehensive plans, unified directions and procedural developments.

I will illustrate what the state system provides on the basis of the example of the study of plutonic mineral resources, since this is closer to me as a scientist and as a geologist. A comprehensive study program, which envisages the drilling of deep and ultradeep holes in combination with geological, geochemical and geophysical research, has been drawn up in our country. The possibility of the systematic clarification of the laws of the formation and development of the earth's continental crust and the opportunity to solve the problem of the scientific forecasting of the search for deposits, which occur deep, are being created. And at the same time the problem of the development of new drilling equipment and penetration to depths of up to 15,000 m is being solved. The comprehensive program in essence was also conceived in order to improve and connect, coordinate our geological concepts for the sake of a single goal--to obtain a systems idea about plutonic mineral resources.

Now about the apprehension that mankind will soon exhaust mineral resources. I do not group myself with the pessimists, but it is necessary to take into consideration the real situation: the stage of raw material abundance on earth in a certain sense is over; in any case, there are noticeably fewer reserves of easily available, "handy" natural raw materials. Whether you like it or not, it is necessary to develop new deposits in remote, hard to reach and sparsely populated regions, under more difficult geological mining conditions and at deep horizons and to study more actively the mineral resources of the world ocean. The steps on the saving of mineral resources and on the replacement of more scarce types with less scarce ones, in general the search for substitutes, as well as the use of secondary resources are of great importance.

[Question] With what achievements are Soviet scientists going to the congress?

[Answer] I will name several, most significant ones. The oldest geological sciences--mineralogy, petrography, stratigraphy and others--are being rapidly developed on the basis of the use of modern methods of the study of rocks, ores and minerals, as well as the achievements of related sciences, such as solid-state physics, nuclear physics, physical chemistry and crystal chemistry and on the basis of the generalization and synthesis of vast factual material. Hydrogeology and engineering geology underwent further development. And finally new directions--geology of the world ocean, comparative planetology, space chemistry and mathematical geology--have taken a firm place in the system of earth sciences.

Unique results were obtained when studying the abysmal structure of the earth's interior. We are proud that owing to the Kola Ultradeep Hole in the Soviet Union a 12-km continuous section of the most ancient rocks of the earth's crust was studied for the first time in the world and ideas about their physical and chemical properties were obtained. Previously we were inclined to assume that some other formations than on the surface might be there. But this was not confirmed. Several theories and hypotheses, which are connected with the structure of the earth's crust and with the processes of ore formation, were checked. In short, the results are exceptionally important. Those who designed the original Uralmash-15,000 automated drilling rig, who at the All-Union Scientific Research Institute of Drilling Techniques drew up the plan of the drilling of the hole and developed such turbodrills, which are capable of destroying any rocks, and many others, who ensured the unprecedented breakthrough into the interior, deserve a separate and major discussion.

The Kola Peninsula was the site of the beginning of ultradeep holes. Now similar drilling is under way in Azerbaijan and the Ukraine. Other geological regions of the Soviet Union are next. At times they ask us: Why are the Americans conducting deep drilling in the ocean, while we are conducting it only on the continent? The Soviet Union occupies a sixth of all the dry land, and it is in our interests to predict scientifically the deep raw material resources first of all on it.

There is another major achievement. The first space geological map of the USSR will be shown at the congress. Photographs from earth satellites like the Kosmos and Meteor, as well as observations from manned spacecraft and orbital stations were used when compiling it. This map makes it possible in principle to look more broadly and in a new way at the direction of research. I will not hide that fact that when its compilation was completed, we were in rapture. But the most interesting scientific and practical questions, which are causing specialists difficulty, immediately began to arise. For example, the giant fault, which begins in the north, from the Timano-Pechora region, then cuts across the Urals and heads in the direction of Kazakhstan, suddenly attracted attention. To what processes of the distant past does it testify? What mysteries does it conceal? It is possible to think a lot about this. Something no less mysterious is also concealed, for example, in the Caspian basin, when you look at the space geological map, at the ring-shaped structures within this basin. If it were a question of ring-shaped structures which are connected, let us suppose, with former volcanoes, everything would be clear. But the Caspian area has a very deep plunge. Then what is

reflected on the surface? What is the physical essence of these ring-shaped structures? It is well known that, having made a representative section of the basin, it is possible to see within enormous salt columns, domes, which measure nearly 2 km. Thus, perhaps, the ring-shaped structures tell us about them? Or about something else? In general, it is a mystery within a mystery. The map gives unusual scope to scientific reflections and serves as a tool of the formation of a general idea about the geological structure of our territory.

[Question] Hence, is a qualitatively new stage in the development of research and in the scientific and technical equipment of geologists beginning?

[Answer] This stage has already begun. Geology, like a sponge, absorbs very quickly the most advanced trends of the scientific and technical revolution and many, many achievements of other sciences. Delay and lagging are contra-indicated to it, because in accordance with its design and of objective necessity it should lead the overall development of productive forces and provide a reserve in advance.

Let us begin with a relatively simple example. Quite recently the analysis of rocks was still made by the chemical or so-called wet method. New methods of analysis--nuclear physical, X-ray spectrographic and others, which make it possible with great productivity to make quantitative determinations of elements--have now appeared.

Profound changes in our work also occurred with the appearance of the electron microscope. Although at first it was intended for metallurgy, for the study, say, of the structure of metals, geologists very quickly grasped the magnificent potentials of the innovation.

And here is an example of another scale. The very active study of the planets of the solar system is under way, a special scientific direction has appeared--comparative planetology. By studying the surface and the environment above the surface of the Moon, Mars or, say, Venus, we attempt to model what could have happened in the past with the Earth. Everything is known in comparison. Although these comparisons are still very approximate, perhaps, insufficiently accurate, they give a certain direction of research.

Modeling and the penetration of the essence of the processes which occurred give an idea about the most ancient rocks of the earth. And many deposits of the most important minerals are connected precisely with them.

Enormous attention has now been attracted to discoveries of ferromanganese nodules on the ocean bottom. The interest is unusual. Several days ago I saw a color film which our geological research vessels brought. The movie camera leads you across the Pacific Ocean bottom for only 20 minutes, but the impressions from life at depths of 5,000-6,000 m are simply staggering. And, of course, the nodules are impressive. The ocean is a source of mineral raw materials. This, of course, is a promising direction.

[Question] Yevgeniy Aleksandrovich, is it too early, apparently, to speak about the practical use of the accumulations of ferromanganese nodules?

[Answer] Why? There are opinions of both pessimists and optimists in this regard. Here I hold in my hands such a nodule. Cathode copper, nickel carbonate, cobalt sulfide, ferrocobalt, mineral fertilizers and slag for construction were obtained from it (true, for the present, of course, only in the laboratory). However, we will not anticipate too much. The serious problems of the economics of such a matter and the methods of raising the nodules from the bottom and processing them have to be solved.

Geology as an applied scientific field cannot ignore any sources of raw materials, but should act very prudently. The main task, which was posed for geologists by the decisions of the 26th Communist Party Congress, is to increase the proved reserves of mineral raw material resources, first of all fuel and energy resources. Confidence in the base is an indispensable condition of the development of industrial production. The intensive, purposeful work of geologists during the current five-year plan has ensured a significant increase of resources. First of all in the petroleum and gas industry, in nonferrous and ferrous metallurgy, in the production of construction materials. The contribution of the workers of Western Siberia is especially great.

[Question] During the trip of Member of the Politburo of the CPSU Central Committee and First Deputy Chairman of the USSR Council of Ministers Comrade G. A. Aliyev along the route of the Baykal-Amur Railway Line, and then at the meeting of the Politburo the questions of the rapid development of the natural resources of Siberia and the Far East were examined.

[Answer] An entire group of questions was examined. The Baykal-Amur Railway Line appears to us as a very large, vitally important artery, which stretches among vast natural wealth. The railway line is making them practically accessible and thereby is acquiring even greater value which, perhaps, for the present not everyone can fully imagine. But geologists are obliged to look far ahead and to reckon the future state benefits. Where will the future spur lines of the Baykal-Amur Railway Line go? Geologists must measure off and work out, "how much there is of what" and what the gain will then be.

Once the talk touched on calculations. Recently we, a large group of specialists headed by Chairman of the USSR State Planning Committee N. K. Baybakov, during a business trip through the regions of the Caspian area examined the questions of the development of the gas and petroleum deposits, which had been detected there. The prospects are tempting. Immediately the question is posed to the geologists: Do you have complete confidence in the prospects, in the corresponding return on the investments? The situation is such that the petroleum and gas occur at great depths. Many scientific and practical problems are arising. One of them is the need for special equipment and tools for the drilling of deep wells under the difficult conditions of corrosive mediums. A tough economic discussion is under way. Here any hopes for luck and geological good fortune are ruled out. Thorough knowledge should be the basis.

[Question] At the congress much attention will be devoted to the geological problems of environmental protection. Please, explain to the readers of NEDELYA the essence of these problems.

[Answer] It is well known: measures on the protection of nature and the efficient use of its resources are a component of the state plans of the Soviet Union. And, of course, a very responsible role is being assigned to geologists in the fulfillment of these plans. They are taking an active part in the formulation and implementation of conservation measures.

I believe that it will be interesting for everyone to know that for the monitoring, for example, of the protection of ground waters a regional network of water regime wells, which numbers more than 30,000 control stations, has been set up by the USSR Ministry of Geology. The reserves of ground waters, particularly at the water intakes for Tashkent, Tbilisi, Novokuznetsk, Sochi and a number of other cities, are being artificially replenished.

Speaking of the efficient use of minerals, I will note that we are devoting much attention to the development of waste-free technology--the use of both the basic and the associated useful components of ores, as well as surrounding rocks.

The problems of the protection of the geological environment in regions of large-scale construction, particularly in the zone of the Baykal-Amur Railway Line, and in regions of the intensive working of deposits are being successfully solved by the advance geological engineering study and forecast of potential changes of the geological mining and cryopedological conditions.

Since environmental protection is a global problem of the present, which encompasses all countries and continents, the Soviet Union along with the implementation of conservation measures of intra-union significance is taking an active part in international cooperation in this area. Together with a large number of states we are taking part in the work on the international scientific project of UNESCO (UNEP) of the USSR, "The Protection of the Lithosphere as a Component of the Environment," of which I am the scientific supervisor.

[Question] You, Yevgeniy Aleksandrovich, went through the practical school of the prospecting and development of deposits. Tell us, does it, this geological good fortune, exist?

[Answer] Of course there is! But it comes when the geologist acts systematically, purposefully. Then luck, as they say, can even be planned. Everything, how he proceeded, went out, how he thought, how he prepared and what experience he acquired in advance, is behind luck. Then how pleasant the ending of all the efforts and experiences is! The discovery of a deposit is their happy completion. And if you have occasion to come once more to the place, to the settlement or city, in the emergence of which you were involved, you experience this happiness again. I experienced such a situation when I visited the region of Komsomolsk-on-Amur, where I worked for a long time. Unreserved joyful memories. The city, which we at one time named Solnechnyy, is the real embodiment of a geological dream.

So many people, so many individuals pass before me! A geologist is most often an individual, and a talented one at that. Determined and in love with the

job. If you are not an individual, it would be better for you not to be in our difficult business. In geology it is necessary not simply to live, but to create.

Now we experienced researchers have gathered at the world forum, but our thoughts all the same return to the young generation, which must still learn a lot. There is a good decent Russian word--staraniye [effort], staratel'nost' [diligence]. My wish is always to see in young people precisely this trait, precisely what distinguishes the occupation of a searcher in the broad sense of the word, who is aimed at a discovery.

The geologist greatly appreciates genuine moral values, companionship, friendship and mutual assistance. We all still like songs. We are all basically musical people. Well, if only because by the nature of the occupation we sense the harmony of the universe, understand rhythm and see the creation of life even in a stone.

It has been noted that divorces are comparatively rare in the families of geologists. A young lad, say, goes after graduating from a higher educational institutions or another specialized educational institutions to a field job and together endures all the hardships of field life. He lives in a tent or some tiny room, in the same, as they say, pot with common hardships and joys. But, being enthusiastic, they become stronger against adversities and more devoted to each other. I have been convinced of this many times.

When conducting sociological studies, for example, on Western Siberia, we assign in them a significant place to questions of a purely human level. How does the specialist feel there and how does he grow accustomed to specific conditions? How, let us suppose, does the special shift method of work influence his health? Such things are components of the fundamental nature of the geological sector.

[Question] It would be interesting to the readers of NEDELYA to find out how the workday of the minister of geology goes, how he organizes his labor.

[Answer] The day, of course, is completely scheduled to the minute. I know how it will take shape already in the evening. It will not be news for anyone that for the executive it is filled with various conferences, meetings, trips to superior organizations and so on. And still everyone's principles of the organization of his day are individual. I specially assign much time for conversations with the executives of geological organizations and specialists from the provinces. Why? The sector involves searches, research, and it is simply impossible not to keep up with today's situation locally. Therefore I strive to be constantly well informed about all the basic operations. The first hint of anything interesting and new becomes immediately known for me. The need to obtain material, to exchange opinions and to become convinced of the veracity and significance of the discovery immediately arises. After a meeting I should be left without fail with a sense of my presence at that place and a knowledge of the state of affairs. And when I later have the time to get there, I merely refresh and supplement this knowledge.

This year I have twice visited Tyumen Oblast, where the main base of the country for the production of petroleum and gas is located. They held conferences on the questions connected with the future additional development of research. A rough conversation took place. But I will tell you frankly: I do not like smooth conferences. If a person has come with his thoughts, suggestions, even critical mood, let him speak to the end.

But these days I also have on me the concerns which are connected with the holding of the International Geological Congress.

[Question] Thank you, Yevgeniy Aleksandrovich, for the account. And for the fact that you were able to "make" during this period, which is especially intense for you, time for a conversation with the readers of NEDELYA.

7807
CSO: 1814/3

DISSEMINATION OF INFORMATION ON ADVANCED KNOW-HOW

Minsk SOVETSKAYA BELORUSSIYA in Russian 31 Aug 84 p 2

[Article by Doctor of Economic Sciences Professor V. Medvedev, director of the Belorussian Scientific Research Institute of Scientific and Technical Information of the Belorussian SSR State Planning Committee: "The Effect of Repetition"]

[Text] The best production collectives have gained abundant experience in the efficient use of labor initiatives. And there are quite a number of them: the system of the management and organization of production of the Volga Motor Vehicle Plant, the Orel method of continuous planning, the brigade contract of the construction workers of Zelenograd, the Ipatovo organization of agricultural operations. Tested by time, they have become an important lever of the increase of the efficiency and quality of labor and have helped many, primarily lagging collectives.

The initiative, which has originated in the collective, is almost always an example of the better organization of production than before. Its use increases labor productivity and product quality and leads to the saving of resources. In recent years the collectives of the Gidroavtomatika and Monolit production associations, the Minsk Paint and Varnish Plant and Plant of Automatic Lines, the Belbumprom Production Association and other associations and enterprises of the republic have improved the production indicators precisely by means of the efficient use of advanced methods of labor and the better organization of work.

It is well-known that any experience is made valuable by repetition. Therefore it is very important to identify and generalize it in time and to disseminate it among other collectives. Scientific and technical information is called upon to play a large role in this. The need for the improvement of the work of scientific and technical information and the transfer to interested sectors and enterprises of scientific and technical achievements and advanced know-how in the area of equipment, technology, the organization of production and management is stressed in the decisions of the 26th CPSU Congress and the 29th Belorussian CP Congress and in the decrees of the plenums of the Central Committee of our party.

The divisions of scientific and technical information of industrial associations and enterprises are making a significant contribution to the dissemination of information on advanced production know-how. These organs carry out the monitoring of the use of information and organize field trips of specialists in the adoption of advanced know-how. In this way a fund on domestic and foreign scientific and technical achievements and advanced know-how is formed and used.

The Belorussian Scientific Research Institute of Scientific and Technical Information of the Belorussian SSR State Planning Committee is the coordinating center of this work in the republic. At it the republic automated system of scientific and technical information, which is a component of the unified State System of Scientific and Technical Information of the country, has been set up and is being improved. In 1983 alone nearly 1 million descriptions of various documents were fed into the republic system, more than 10,000 recordings on magnetic tapes, including more than 1,500 on advanced production know-how, were prepared. In all 462 enterprises and organizations of the republic use the documents of the system. Last year 518,000 information reports on innovations were issued to subscribers.

However, there are still quite a number of shortcomings in this work. Very often the information on advanced know-how does not get to the user, at times arrives late and becomes obsolete. It is connected with the fact that many divisions of scientific and technical information in the number and skills of personnel do not meet the requirements which are made on them.

Another problem consists in the fact that many enterprises and ministries of the Belorussian SSR are not following the regulations on the submitting to intersectorial organs of scientific and technical information of the materials which reflect the essence of the know-how, which has originated at enterprises. For example, the ministries of the construction materials industry, installation and special construction work, local industry, as well as the fuel industry of the republic in the past 3 years have submitted to the Belorussian Scientific Research Institute of Scientific and Technical Information only three reports each, the Ministry of Rural Construction and the Ministry of Trade--one each, while the Ministry of Procurement in general maintained silence.

We are also faced with the fact that a significant portion of the materials, which arrive at the institute, does not reflect the essence of the advanced know-how. In the information of a number of enterprises, which have been winners of the all-union and republic socialist competition, numerical material frequently predominates and the anatomy of the know-how is not revealed.

Many enterprises are violating the mandatory regulation on the submitting to the Belorussian Scientific Research Institute of Scientific and Technical Information and the Scientific and Technical Information Center of information cards on the advanced know-how which has been introduced in production. In 1983 in Minsk Oblast information cards on advanced know-how were received only from the enterprises of the Belorussian SSR Ministry of Light Industry.

The problem of the efficient use of advanced know-how is not confined, however, to information. Advanced know-how is the creative work of the masses, and it is also necessary to approach its use creatively, with a sense of responsibility. A mass movement for the periodic revision of the output norms and the rates of consumption of materials originated 15 years ago at the Aksay Plastics Plant. An incentive system for the revision of the norms, which is comprehensible to every worker, is operating successfully at the plant. As a result the expenditures of time on the output of products have been decreased by more than 600,000 standard hours, while labor productivity at this enterprise is increasing threefold more rapidly than on the average for the sector. Following the example of the Aksay workers the workers of other plants and factories are revising the norms. This is yielding a significant economic impact.

However, in Belorussia the know-how of the Aksay workers is being used inadequately. The same thing can be said about the dissemination of the system of the Volga Motor Vehicle Plant. Today only 18 enterprises of the republic are working in accordance with the know-how of the Volga Motor Vehicle Plant.

Taking into account the shortage of manpower resources, the know-how of the Shchekino Chemical Combine in increasing the production of output with a smaller number of personnel is acquiring particular importance. In 1983 alone the introduction of this method made it possible to free in the republic more than 7,000 people and thereby to save about 11 million rubles of the wage fund.

Considerable experience of working in accordance with this method has been gained at the Minskproyektmebel' Production Association, the Orsha Flax Combine, the Lida Footwear Factory, the Minsk Motor Plant and others. However, for the republic as a whole it is unsatisfactorily taking root. In the Belorussian SSR Ministry of the Forestry Industry only 3 of the 92 enterprises are working with a smaller number of personnel, in the Ministry of Light Industry--22 of 97, the Ministry of Industrial Construction--8 of 28.

The extensive dissemination of the Shchekino method is being checked due to the upsetting by ministries and departments of the stability of the planning of the wage fund, which, in turn, lessens the interest of collectives in the elaboration and implementation of measures on the freeing of a number of personnel. The effectiveness of the use of this method is low. On the average each of the 1,000 enterprises and associations of the republic with an average size of 1 enterprise of 900 people accounts for less than 30 freed workers.

In the early 1970's the practice of drafting counterplans was revived on a new material and organizational basis. Its goal is to increase the intensity of the plan assignments and as a result to increase the output of good quality products by means of the better use of equipment, raw materials and time.

And still it must be admitted that counterplanning for the present has not undergone proper development in the republic.

What is the matter here? First of all there is the low stability of the approved plans. The ministries immediately deliver additional assignments to the enterprises, which complete the year successfully, but take away the unfulfilled part from lagging plants. At times the problem of decreasing the number of poorly operating enterprises in the sector is solved in this way. The harm of such adjustments finds expression not only in the fact that the ministries are contributing to the violation of planning discipline. The main trouble is: the leaders are as if punished economically for good work, while the laggards do not strive to improve the work, since they know that at the end of the year they will make the assignment easier for them.

The development of counterplanning is also being checked because the approved plans are often not completely balanced with material and technical supply. And the ministries do not always help the enterprises to receive regularly and on the planned dates from other sectors and regions metal and components through cooperation and do not organize uninterrupted supply with fuel and power. During the current five-year plan a new statute on the procedure of the drafting of counterplans and the stimulation of their fulfillment was approved. The incentive funds have been increased. However, radical steps, which liberate the initiative and economic enterprise of labor collectives and increase their responsibility for the assigned work, are needed in order to reject the obsolete practice.

Advanced know-how will yield the greatest return when all the problems, which are connected with its use, are solved in combination. Several ministries and departments have gained much that is valuable in this area. The practice of the enterprises of the textile industry, where assignments on the introduction of advanced know-how have been established for all collectives and the base indicators for its experimental checking have been specified, for example, merits attention.

Practical experience confirms the great effectiveness of regional systems of the introduction of the know-how of innovators, which combine the territorial and the sectorial principles of work.

The experience of the economic organs and public organizations of Donetsk Oblast is of interest. Here a regional system of the introduction of advanced know-how, the main peculiarity of which is the systematic approach to its introduction at all levels of management, has been set up and is operating successfully here.

In the Belorussian SSR, unfortunately, for the present there is no united organizational system, which would have the necessary means, powers and personnel for the generalization, coordination and introduction of innovations at enterprises regardless of their departmental subordination. In our opinion, the question of the unification of the efforts of the organizations and departments, which are engaged with the study and dissemination of advanced know-how, into a united, integral system should be examined. The state organ, which is responsible for this work, should be determined. The Belorussian Scientific Research Institute of Scientific and Technical Information of the Belorussian SSR State Planning Committee could be the main information and analytical unit in this system. It is necessary to supply the

system with modern computer technology, which will make it possible to set up and keep a problem-oriented data bank on advanced know-how. The specialists of this system should, of course, systematically keep track of, identify, generalize and analyze the state of affairs with the introduction of innovations in various departments, at associations and enterprises.

The fact that at enterprises and associations, as a rule, there is no special structural subdivision for the dissemination of what is new and advanced and there is also no special reporting, is also one of the shortcomings in the area of the planning, dissemination and introduction of advanced know-how. Measures on its introduction are included in the plans and reports on new equipment, efficiency work, scientific and technical information and the scientific organization of labor and in organizational and technical measures. The advanced know-how of other enterprises of the country, as well as the CEMA member countries is not being studied and is not included in the plans. The system of stimulation for the identification, dissemination and introduction of innovations is imperfect. Many enterprises do not stimulate their staff members at all for this work, at two out of every three plants and factories the corresponding statutes have not been drafted.

The sages of antiquity called the essence of experience the bow lights of a ship, which light the way ahead and enable the ship to sail quickly and boldly. Without requiring special additional expenditures, the assiduous, practical use of everything valuable and advanced helps to increase sharply the efficiency of social production.

7807
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EFFECTIVENESS OF RESEARCH WORK DEPENDS ON RESULTS, NOT DEGREES--KARPOV SYSTEM

Moscow KOMSOMOLSKAYA PRAVDA in Russian 27 Jul 84 p [illegible]

[Discussion "Direct Dependence--The Karpov System Has Already Been Functioning for 15 Years. What Are Its Results. The Initiators Answer." Recorded by V. [illegible]]

[Text] Participating in the discussion were Director of the Scientific Research Physicochemical Institute [NIFKhI] imeni L. Ya. Karpov, Academician Ya. M. Kolotyrkin, Institute partkom secretary Candidate of Chemical Sciences A. P. Korotkov, and trade-union committee chairman V. P. Vavilov.

Ya. Kolotyrkin: An important condition for fruitful work of a research staff is the interest of each staff member in the maximum effectiveness of his labor and the attitude to participate in the working out of problems which are of the greatest importance to the development of science and technical progress. At the present time, however, this is greatly hindered by the "excessive" interest of scientific workers in preparing and the defense of candidate or doctoral dissertations. This interest sometimes becomes an end in itself and induces the following of the easiest and most beaten paths of science. Having completed the dissertation, the worker often settles down and falls behind in his creative growth. The obvious cause for this is the dependence of the salary primarily upon academic degrees and titles, and a lack of its relation to the real results of the scientific worker's labor.

However, when this dependence was reduced to a minimum at our institute as the result of the implementation of the "Karpov" system, a powerful incentive appeared to increase the creative activity of each staff member, and to increase the interest of the workers in the full and efficient use of the working time as well as in the most rapid assimilation of research results into production. On the other hand, the rug has been pulled out from under mere time-servers, "loafers with a degree," and all kinds of incidental people in science.

However, if one is to evaluate the effect of the new system as a whole, quite a convincing picture emerges. As examples I will cite several of the most graphic indicators. Compared to the beginning of the experiment, the present volume of scientific research projects under way at the institute has increased by [illegible] percent with a practically unchanged number of staff members. The proportion of completed or prepared for practical application work has increased an

average of 2.2-fold, and the number of inventions by nearly 4-fold. The Institute now receives an average of two patents for each researcher every year. The transition to the new system also had a quite positive effect on strengthening the ties between the Niipar and the sector institutes of the Ministry of the Chemical Industry and of other departments. The number of contractual agreements for creative cooperation with these establishments more than tripled.

A. Korobko: In developing the system we attempted first of all to make it one of the powerful levers for raising the effectiveness of socialist competition. Our long-term experience of using the system showed convincingly that a regularly conducted strict and objective evaluation of the effectiveness of the researchers' work serves as the basis without which, in our view, the organization of genuine competition in a scientific collective would be unthinkable, and it in turn promotes a more exacting attitude toward personal creative plans, constant self-control, and increased exactingness between managers and researchers on all steps of the structural ladder.

As a result, the demands made by scientific subdivisions upon the Institute management have increased in regard to both furnished modern equipment, and also in regard to the performance of auxiliary sections. Under the influence of these demands the management with the assistance of the Ministry carried out extensive measures to modernize laboratories, which, in turn, led to the reorganization of the experimental services. As the result, specialized groups for experimental services were organized and the subdivision dealing with questions of introduction of the Institute's achievements into industry was noticeably strengthened.

V. Vavilov: A new stage in the improvement of the organization of socialist competition at the Institute involves the establishment of a point system for evaluating the effectiveness of the performance of subdivisions and the remuneration of bonuses to research staffs within the framework of the "Karpov" system. It is based on a yearly cycle. In institute subdivisions with a production character of operations, the results of the competition are summed up twice a year.

The evaluation of the performance of scientific subdivisions is made at one of the sessions of a commission. All scientific subdivisions provide it with the necessary information, covering all aspects of the activities. Each of the types of scientific output is evaluated on points with a quite definite value for the majority of indicators. For example, an article is 10 points, an author's certificate--20 points, a GOST standard--30 points, etc. And for those where the comparative or quantitative aspect of the work is of considerable importance, an upper and a lower limit for the evaluation are established. For example, a review is 30-60 points, a monograph is 80-150 points, the start-up of an experimental pilot plant is 100-150 points. In such cases experts are invited to evaluate the indicators.

We have in no way found that fundamental research, which provides information valuable to theory, and consequently for practice as well, is relegated into the background. In our work such a major contribution to science as a discovery is evaluated no lower than the start-up of an experimental installation.

As analysis of the course of socialist competition among laboratories during recent years has shown, the greatest successes are achieved by collectives which harmoniously combine theoretical research with applied work. In addition to the point evaluation, the commission on the evaluation of effectiveness has the right to render an expert opinion which takes into account such aspects as the urgency of the projects, scientific-organizational performance, plan discipline, etc.

The final indicator is determined by dividing the sum of the points by the actual yearly wage fund of the subdivision, and serves as a basis for distributing the laboratories in groups according to the effectiveness level of their performance. Collectives included in the same group are awarded bonuses according to the year's results in the same percentage ratio to the actual wage fund. The awarding of personal bonuses to individual workers in the subdivisions is performed by appropriate supervisors with the concurrence of trade-union organizations.

A. Korobko: Socialist competition at the NIFKhI for raising the effectiveness of scientific research is harmoniously combined with the movement for a communistic attitude toward labor. This movement has acquired broad scope: about 60 percent of all institute employees are shock workers of communist labor. The majority of the subdivisions bear the title of "Collective of high labor culture," or "Collective of communist labor." Now the task has been set to transform the entire institute into a model scientific establishment. The way to a successful attainment of this goal lies through the further improvement of the organization of socialist competition, supported by the foundation of the "Karpov" system.

2366
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USSR Institute, Enterprise Urged To Expand PATENT SERVICES

Moscow IZVESTIYA in Russian 7 Jan 85 p 4

[Article by Ye. Tsedrik, engineer "This 'Malevolent' Expert",

[Text] As someone of the Institute staff said, this building is filled to [illegible] papers and conflict situations. In regard to the [illegible] and people, that's for sure. The papers do not fit in the ordinary office file drawers situated in the rooms. Having overfilled them, they have flooded over into the corridors lined with tall metal shelves. And the staff... never mind them--1.7 square meters [spaced] per person. The desks abut one another. The lobby is filled with people, crowding, aroma, noisy. These are experts [illegible] with authors! But what can be done if there never is any space in the room especially set aside for this purpose. I glanced into this room--it is next door. About ten desks, surrounded by people, and a din such as should not [illegible] be heard at ministry offices.

Within--the All-Union Scientific Research Institute of State Patent Expertise is a relatively young establishment. It was founded in 1966. Until this time we had no united expert center. This work was carried on in departments. The expertise proceedings dragged on for a long time: five to seven years on the average. And by today's standards there were very few applications submitted in those days for inventions. During the year in which the Institute was founded there were only 33,000 of them. In 1980 this rose to 82,000. And despite this, the average duration of processing an application was reduced to 4 years.

The Institute is unique not only due to its operational profile, but also because half of its staff are part-time workers, supernumeraries, employees of various other establishments. About one-third of them cease to work in the Institute for one reason or another during a year. And the full-time staff members work at a great intensity. We are forced to continuously overfulfill the monthly work quotas with the applications. What can be done--there is a shortage of people, but the time for reviewing applications is short.

I know of several institutes where the patent service is sufficiently well [illegible]. What a patent expert accomplishes there in a year is done by the expert at the Within in a month or two. Such is the work load. In order to [illegible] this somehow, preliminary expertise screening had to be organized. What is [illegible] is a legal document which must be processed in an appropriate [illegible] form. The task of the preliminary expertise is to return to the [illegible]

was been processed incorrectly, and issue advice on how the document should be compiled. During the past year about 50,000 applications were returned to the authors for this reason. During the same period the primary scientific and technical expert panel refused to issue about 70,000 authors' certificates to authors submitting applications. These showed to have no indications of being inventions. These 70,000 cost the State a great deal. After all, to perform a search, a large mass of patent documentation must be examined, digging up documents for the last 50 years. If the proposal concerns only one specific area, this means about 2,000 documents, if the proposal could be used in various sectors of the national economy, then on the order of 10,000.

I relate this not without purpose. Examination of one application at the level of a scientific and technical expertise panel costs the State an average of 55 rubles. In controversial cases, when the author disagrees with the expert opinion, the application is examined at the control council of Goskomizobreteniye (State Committee for Inventions and Discoveries). In a word, about 100 rubles on the average.

There can be different authors, and consequently, their relationships with the experts take different forms. To listen to some of the aggrieved ones, these malevolent experts do nothing but poke sticks into the wheels of technical progress. They restrain the inventor, who thinks day and night of the welfare of the national economy. But if one turns to statistics, it turns out that unjustified rejections of applications for authors' certificates constitute less than one percent of all rejections. Therefore, in the remaining 99 out of 100 cases the institute experts were acting correctly.

In this connection, here is what deserves some thought. Ninety percent of all applications for inventions submitted are generated in the staffs of institutes, plants and other establishments. They were discussed there, processed, a patent search was supposedly also performed to see if there may be a similar invention. And only after all this, sent off for State expertise evaluation. Nevertheless, only half of these applications turned out to be suitable for the issuance of authors' certificates. What is the trouble, then?

Ismail Sergeyevich Chupakhin, doctor of technical sciences, recipient of a USSR State prize and author of over 40 inventions, recounted:

"At some institutes a real contest is organized to see who will submit the most applications. And this is no accident. Circumstances are conducive to this. A researcher is working on a planned theme, but they tell him: 'You must work on the level of inventions.' And you make a commitment--to submit a number of applications. If you have no sensible ideas, you start looking for ways around it. You take an existing patent, think up some insignificant modification--and there you have ready material for an application. You have fulfilled your commitment. So everything ends well. And if they pay you author's prize money on top of this, all the better. You will receive this not for having your invention used by industry, but for having made it. There is such a regulation: for each author's certificate a one-time reward is paid at the place of employment. There are people who really specialize in trivialities, and imagine it, a sizable sum accumulates."

"But how can one right this?"

"Two things need to be done: first, develop the patent services at enterprises and institutes, and secondly, increase the responsibility of the administration. After all, every application to the experts is accompanied by a letter with seals and signatures. They say, our establishment recommends that this application be considered, we consider the proposal to be quite deserving of an author's certificate. The seals and signatures are affixed without any special hesitation. Who is risking what? So what if the experts refuse. Let them go around, maybe this really is--an invention?"

Mikhail Sergeyevich is right! This is just how it happens. I know of a case when a fully respectable establishment submitted for expertise a "fundamentally new" machine, which they intended to place in production themselves. The paper accompanying the application bore the chief engineer's signature. As it turned out, this machine was invented nearly half a century ago.

If the Goskomizobreteniye committee had not intervened in this matter, the machine might have been placed in production. And it would be recorded in all reports as new equipment, all participants in this work would be due sizable rewards, they would be praised and presented as examples to others. But is this really an isolated case? All this indicates but one thing--poor organization of patent research on the local level.

So far we have been talking about "organized inventions." But after all, there also is a large number of "unorganized" ones. They too are often denied assistance of an author's certificate, and for the same reasons. Evidently the patent services of VOIR (All-Union Society of Inventors and Innovators) working with them need to render better assistance to individual inventors.

The Goskomizobreteniy committee takes measures to establish local patent funds and supply these funds with appropriate documentation. A network of information centers for inventors is already operating in the country, but enormous efforts still lie ahead to develop them and organize new ones. But now in these times use what is being done?

The latest survey showed that 30 percent of the industrial enterprises have 50 percent of scientific research institutes have only one staff member for patent work each. And what can one person accomplish in such matters? More than a fourth of the enterprises do not compile reports on patent research at all, and consequently do not pursue it. And if they do pursue it, then how?

Those 70,000 applications rejected by the expertise last year alone--after all they were basically prepared with the participation of patent workers at enterprises. It turns out that the patent search was performed poorly, inconsiderately. This was quite expensive to the State. Multiply 30 rubles by the 70,000, and you will get the total sum of the incurred loss. Actual labor is in necessity this is of course larger, because conflict situations were arising between the institute experts and the authors of the applications. After all, conflict too takes place at the expense of the State.

Mikhail Sergeyevich Chupaknin has no conflict situations. I inquired why not? He answered: "Because our patent service is working the way it is supposed to work."

And at the VNIImetmash [All-Union Order of Lenin Scientific Research and Project Design Institute of Metallurgical Machine Building] Institute, where Academician A. I. Tselikov is director, I asked the same question, and was given the answer that they have a strong patent service, and for that reason arguments with the expertise are rare. The institute sells its output abroad, patents it there, in a word, does things properly. And at the Electric Welding Institute imeni Ye. O. Paton the patent services are well developed, and hence the many successes of the institute. It is a great thing when people work with patents when developing new equipment. After all, the technical development for which a patent was issued appears long before industry can market it. Years pass. A person working from patents is always the first to learn what is new, and if the patent experts studying the appropriate documentation and analyzing it, are able to determine trends in the development of one area or another, then all the better. Then, those who develop new equipment know in which directions one should look for the best solutions, and on which no time should be wasted. Alas, not all managers of industrial enterprises and institutes have understood this. Far from all. No, it is not a malevolent expert that bars the path of technical progress, but the lack of understanding of all the importance of work with patents. Stagnation of thinking! A decisive struggle needs to be waged against it. In our fast-moving times, to develop new equipment without considering the latest advances--this means to consciously retard technical progress.

[illegible]
CSO: 1814/209

INTENSIFICATION, INCREASE OF EFFICIENCY OF PRODUCTION

Minsk SOVETSKAYA BELORUSSIYA in Russian 28 Aug 84 p 3

[Article by V. Zharikov in the column "In the Notebook of the Political Information Officer": "The Reserves of Intensification in Action"]

[Text] An Approximate Plan of the Discussion:

1. The Intensive Means of the Development of the Economy.

2. The Basic Evaluation Indicators and Levers of Intensification in Industry.

3. The Participation of Labor Collectives in the Increase of Production Efficiency.

In the decisions of the 26th CPSU Congress and the subsequent CPSU Central Committee plenums the particular importance of the further intensification of social production was stressed. Today it is called the main direction in the development of our entire economy.

What is intensification?

This word signifies the straining, the stepping up of activity. But as a whole the formula, which has become the slogan and motto in the work of many enterprises: "Provide More Output, of Better Quality, With Fewer Expenditures of Resources," determines the concept. Whereas the extensive means of the development of the economy involves the quantitative increase of the output of products, the increase of the volumes of the use of raw materials and other resources and the opening of new workplaces and enterprises, the intensive means signifies qualitative development, the increase of the yield of capital investments by means of the better use of the available production potential and the development of more productive equipment, advanced processing methods and the organization of labor.

In the world economy there are two fundamentally different means of using the principles of intensification. The capitalist means is the pursuit of superprofits, the increase of the intensity of the labor of people, the use of the achievements of scientific and technical progress for the intensification

of the exploitation of the working people. The sweat system in the organization of capitalist production today is manifested especially vividly in the example of U.S. industrial monopolies. With the increase of unemployment and the decline of the wages of workers the profits of the automaking, petroleum and other monopolies are increasing at a gigantic pace. The combination of the capitalist "rationalization" of production, the firing of people and their replacement by robots with the inordinate intensification of labor, with a pace of operations on assembly lines and other conveyors, which have been boosted as much as possible and drain all the strength from a person, enabled big business corporations to derive record profits even during the years of the economic crisis.

In our country the implementation of Lenin's plan of electrification laid the foundations and predetermined the first steps toward the efficient use in the practice of socialist management of the principles of intensification. Their essence: while creating better working conditions for workers, mechanizing and automating production, to strive for the increase of the output of products per meter of production areas, per hectare of labor, in order to increase the national income of the country, is the bases of the increase of the well-being of people. In this lies the basic difference of the socialist means of the intensification of production.

In recent years such a direction in the development of the economy has acquired particular urgency. This is due to the fact that the extensive factors are exhausting themselves--in practice all the zones have been developed in agriculture, the influxes of natural resources are also decreasing in industry, their cost and difficulty of extraction are increasing. The decrease of the influx of workers is complicating the situation. Therefore it is so important, without decreasing the pace, to increase the production of output by means of intensive factors, that is, by increasing the efficiency of social production.

What are these factors?

At enterprises a specific set of indicators exists for the determination of the intensification of production. One of the most important ones among them is the factor of the use of manpower resources through the indicator of the increase of the production volume due to the increase of labor productivity. During the current five-year plan the task has been posed to boost this increase to 90 percent for the country as a whole. As the results of the work of republic industry for 7 months of this year show, labor productivity here increased as compared with last year by 5.4 percent. By means of this factor 87 percent of the increase of industrial output was obtained. Many labor collectives of enterprises and entire regions are achieving good results. Thus, the industry of Minsk, Novopolotsk, Orsha, Pinsk, Mogilev and Bobruysk obtained the entire increase of commodity production by the increase of labor productivity. However, 80 production associations and enterprises did not fulfill the plan assignments. The proportion of such enterprises in Grodno, Brest and Gomel oblasts is significant.

Another important factor of intensification is the increase of the yield of fixed capital and the acceleration of the movement of working capital. It is

possible to illustrate in the discussion the importance of this indicator by the following figure--the increase of the output-capital ratio by just 1 percent will additionally give the country about 5 billion rubles of national income.

In the time, which has passed since the beginning of the five-year plan, at many enterprises and in the sectors of our republic the yield of fixed production capital has steadily increased. For example, at the Pinsk Spinning and Knitwear Production Association, at the majority of plants of Orsha, at the enterprises of the Belorussian SSR Ministry of the Fuel Industry and others. However, for the republic as a whole the output-capital ratio is decreasing. The basic reasons for this are shortcomings in the organization of production and large reserves of uninstalled equipment. The frozen capital in purchased, but unused machine tools comes to millions of rubles. The collectives of the Bobruysk Plant of Machines for the Application of Fertilizers, where at the beginning of this year there was uninstalled equipment worth 770,000 rubles, and the Pinsk Association of Forging and Pressing Automatic Lines, where 1.6-fold more equipment than envisaged by the plan has been accumulated and where the coefficient of the utilization of machine tools last year came to only 0.48, have set records of mismanagement in this respect. That is, more were idle than were in operation. At the Bobruyskdrev Association machine tools and lines worth 666,000 rubles and imported equipment worth 344,000 rubles are deadwood.

It is well known that the increase of the machine shift coefficient is the most important reserve of the increase of the output-capital ratio. Unfortunately, in republic machine building during the current five-year plan it has remained at the level of 1.49. This means that the machine tools operate only 10 hours a day. Things are even worse with the use of equipment at flax processing enterprises, where for this reason raw materials for more than the 6-month production program have been accumulated. Computers are being used poorly. The computer shift coefficient comes to 0.7-0.8. But this is very expensive and highly productive equipment. Its continuous utilization is necessary so that it would pay for itself. According to the calculations of specialists, the increase of the operation of equipment at machine building enterprises by just 1 hour would make it possible to additionally produce output worth 890,000 rubles.

Not everything is well with the acceleration of the movement of working capital. Excessive stocks of raw materials are piling up at many enterprises. As the check of enterprises of the Belorussian SSR Ministry of the Construction Materials Industry showed, this year 65 percent of their total number allowed above-standard stocks of materials, due to which capital worth 3.7 million rubles was diverted from the economic turnover. For the ministry as a whole the turnover rate slowed as compared with the plan by 6 days, due to which material resources worth 6.8 million resources were diverted.

One must also not forget such factors of intensification as the decrease of the materials-output ratio of products and the increase of their quality. Unfortunately, many items produced in the republic are still inferior in the materials-output ratio and quality to the best foreign models. True, this year many enterprises have improved the work in this direction. In 7 months

for the republic as a whole the proportion of products of the highest quality category increased by 12.6 percent as compared with the same period last year. The enterprises of Brest, Vitebsk and Grodno oblasts achieved an especially significant increase.

In the discussion it is necessary to devote particular attention to the analysis of those methods of intensification, which are used at enterprises. They can be arbitrarily grouped according to three direction. Measures of the retooling of production--the introduction of new, more productive equipment, automation equipment and advanced technology--belong to the first group. The mobilization of social factors, that is, the tightening up of labor discipline and order, the stepping up of creative technical work and initiative, the introduction of advanced methods of labor, the increase of the skills of workers and engineers, belongs to the second group. And the third direction is measures on the improvement of the economic mechanism.

Much is being done in the republic in each of these directions. The achievements of scientific and technical progress are being actively used at enterprises. In industry in 1983 430 mechanized flow and automatic lines were installed, 230 sections, shops and works were changed over to complex mechanization and automation. More than 2,000 inventions and 134,000 efficiency proposals were used in the national economy of the republic. The output of NC machine tools, industrial robots and machines and equipment with higher technical and economic parameters is increasing at a leading rate. The production of 360 descriptions of new types of industrial products was assimilated.

In recent times quite a number of highly efficient technologies have been introduced. At the Minsk Bearing Plant, for example, the process of producing parts of bearings with the use of metallic powders was introduced. This decreased the labor-output ratio, the need for the casting of steel pipe and its subsequent machining disappeared, and this also decreased the metal content of products. It is characteristic that the use of metallic powders in the production of parts promotes the decrease of the labor-output ratio and frees 190 workers per ton of powders.

Laser equipment is being used extensively at the Minsk motor vehicle, tractor and other plants. Its assimilation for cutting, welding and thermal hardening and in other operations in the production of parts for machines increases their service life by 1.5- to 2-fold, which is equivalent to the same increase of the volume of production of parts with the decrease of the expenditures of working time.

At the same time 9 ministries and departments of the republic did not fulfill the assignments on the development and introduction of new equipment, and 12 did not last year. Equipment for the plasma machining of parts was not introduced by the Zapelektromash Production Association, as well as by repair enterprises of the State Committee for the Supply of Production Equipment for Agriculture. At the Brest Myasomolmash Plant the output of automatic machines for the production of sausages in artificial casings is being assimilated slowly. At several enterprises the losses of work of

due to the violation of labor discipline and idle times of equipment are still large. All this is adversely affecting the rate of intensification.

The discussion can gain in many ways, if the political information officer tells in detail about the participation of the workers of his collective in the campaign for the shortening of the time of the assimilation of new equipment and for the introduction in production of advanced technology and advanced methods of labor. It is necessary to make the audience aware of an incontestable truth: the rate of intensification of social production and, hence, the material base for the increase of the well-being of the people depend on the activity of every worker and engineer, every collective.

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NEW LENINGRAD MEMBERS OF USSR ACADEMY OF SCIENCES PROFILED

Govyrin, Gorynin, Kondrat'yev, Solomenko and [illegible]

Leningrad LENINGRADSKAYA PRAVDA in Russian No 6 (21350), [illegible] Jan 8[illegible] p [illegible]

[Text] The article introduces five residents of Leningrad recently elected full members (academicians) of the USSR Academy of Sciences (see the Daily SNAP, 9 Jan 85 p 2, col 3). They are V. A. Govyrin, I. V. Gorynin, K. Ya. Kondrat'yev, N. S. Solomenko and A. [illegible].

Following are excerpts from the profiles of the academicians. "Professor Vladimir Aleksandrovich Govyrin, director of the USSR Academy of Sciences' Institute of Physiology imeni Pavlov, is an eminent scientist in the field of physiology of the vegetative nervous system... V. A. Govyrin discovered the phenomenon of neurochemical and pharmacologic heterogeneity of [illegible] nerves of vessels. This discovery is of fundamental scientific importance for vascular-wall physiology and the understanding of mechanisms of [illegible] tension. The structure of molecules of substances which are [illegible] for an organism's vital activity have been studied in depth by this scientist and his associates, using modern methods of [illegible] and theoretical conformational analysis. These were [illegible] for purposefully directed synthesis of biologically active substances..."

"Linked with the name of Professor, Doctor of [illegible] Igor' Vasil'yevich Gorynin, Laureate of the Lenin and USSR State Prizes, are important achievements of Soviet science in the field of materials science and technology for creating metallic materials. [illegible] research work is directed at solving important problems of [illegible] science of phase transitions and of physical principles of the strength and plasticity of a wide range of materials. The [illegible] which I. V. Gorynin has made to the formulation of principles of [illegible] the regulation of structure must be mentioned in particular. [illegible] principles have provided a theoretical basis for obtaining new [illegible] structural materials with special physical-chemical and mechanical properties. It was these works which led to the development of a number of new [illegible] steel and alloys based on iron, aluminum, titanium, molybdenum, niobium and other metals..."

Professor Kirill Yakovlevich Kondrat'yev's scientific interests lie in the field of the physics of planets' atmospheres and the history of the cosmos. The unique programs of the Large-Scale Energy Experiment (KENEKS) and the Global Aerosol--Radiation Experiment (GAREKS) were drafted under his direction. The implementation of these programs made it possible to develop a new concept of the atmosphere's radiation energy, which has played an important role in the study of factors that determine present-day changes in the climate. Closely associated with this direction are works of this scientist which are connected with numerical modeling of the atmosphere's greenhouse effect and its effects on climate. K. Ya. Kondrat'yev has summarized results of his climate physics and chemistry research in a series of monographs which have been published over the last decade. The scientist has also initiated work in the field of comparative meteorology of the planets and in the study of the Earth's environment and natural resources with the aid of aerospace means of observation...

"Professor N. S. Solomenko, first deputy chairman of the presidium of the USSR Academy of Sciences' Leningrad Research Center, USSR State Prize laureate and a meritorious scientist and engineer of the RSFSR, is a specialist in the field of mechanics and control processes and the author of almost 140 scientific works, including three monographs. This scientist's works deal with problems of structural mechanics and engineering structures' statics and dynamics, as well as problems of the reliability of structures of various objects and of the automation of designing. He is the author of basic studies of the stressed and deformation states of elastic, nonlinear-elastic and elastic-plastic systems, and of these systems' dynamic stability under nonstationary loads. Professor N. S. Solomenko has formulated principles, criteria and effective methods for optimizing complex engineering structures, and a number of major experimental studies have been performed under his immediate direction. N. S. Solomenko heads the scientific council on problems of automation and control of the USSR Academy of Sciences' Inter-Agency Coordinating Council in Leningrad, he is a member of the scientific councils on the large-scale problem 'Hydrophysics' and on synthetic structural materials under the academy's presidium, and he is a member of the bureaus of the academy's scientific councils on problems of strength and plasticity, and on structural mechanics and theory of structural shapes. N. S. Solomenko was elected a member of the USSR National Committee on Theoretical and Applied Mechanics in 1983."

"Professor Aleksandr Mikhaylovich Ugolev, head of a laboratory of the USSR Academy of Sciences' Institute of Physiology imeni Pavlov, is a prominent scientist in the field of the physiology and regulation of vegetative functions. He is the author of 200 publications, including eight monographs and one scientific discovery. This scientist has made a major contribution to the physiology of digestion and nutrition. He discovered, substantiated and formulated a new principle of digestion physiology--membranous or parietal digestion..."

Photographs of the five academicians are given.

Bonch-Bruyevich, Golant, Miroshnikov and Spasskiy Profiled

Leningrad LENINGRADSKAYA PRAVDA in Russian [illegible]

[Text] The article introduces six residents of Leningrad who were recently elected corresponding members of the USSR Academy of Sciences. Among them are A. M. Bonch-Bruyevich, V. Ye. Golant, M. M. Miroshnikov and I. D. Spasskiy.

Following are excerpts from the profiles [illegible] Aleksey Mikhaylovich Bonch-Bruyevich is a scientist with a wide range of scientific interests. [illegible] field of [illegible] physical optics. [illegible] departments of the State Optical Institute. [illegible] field of laser physics, [illegible] of new designs of [illegible] quantum generators. [illegible] the first quantum [illegible] based on neodymium glass, [illegible] before [illegible] abroad. The scientist was awarded the USSR State Prize for this work. The scientist was the first in the USSR to [illegible] systematic studies of effects of powerful coherent radiation [illegible]. The results of these studies, [illegible] radiation [illegible] practical [illegible] scientist's work [illegible].

[illegible] Academy of Sciences' Physical-Technical Institute, [illegible] specialist in the field of [illegible] scientific work [illegible] problem, including [illegible] Physics, which has been published [illegible] As a result of this research [illegible] devoted to plasma [illegible] waves with plasma. [illegible] importance. They have already found [illegible] in the [illegible] ideas connected with [illegible] control [illegible], such as the heating of plasma. [illegible] plasma [illegible] still [illegible] plasma by [illegible]

[illegible] ment [illegible] two discoveries [illegible] said that this scientific [illegible]

scientific potential of the optics industry and of branches of the economy that are associated with it. In recent years, M. M. Miroshnikov has been seriously engaged in research in the field of iconics--a new scientific direction which studies general properties of images as a specific form of transmitting and storing information. Research of the radiation of natural formations and of various objects in the optical region of the spectrum is being conducted in our country on a broad scale under Professor Miroshnikov's scientific direction. Many scientific organizations are now using results obtained in the process of this work as source data for the development of new instruments. These results have also provided a basis for the series production of infrared-imaging instruments as diagnostic and nondestructive-testing equipment for medicine, machine building and microelectronics. These instruments are patented in such countries as the USA, Great Britain and the Federal Republic of Germany."

"Power machine building plays a special role in accelerating the pace of scientific and technical progress... Professor Igor' Dmitriyevich Spasskiy, a laureate of the Lenin and USSR State prizes, is a leading Soviet specialist and a talented organizer of the production of large power-engineering complexes. Plans for a whole series of complex structures specialized for machine building have been formulated under his scientific and technical direction. Efficient specifications for technical equipment, an optimal control structure for it and fundamentally new methods for heightening its reliability have been prepared by this scientist and are already being used in the designing of power machine building complexes..."

Photographs of the four scientists are given.

CSO: 1814/68

AWARDING OF 1984 USSR STATE PRIZES IN SCIENCE, TECHNOLOGY

Moscow PRAVDA in Russian 7 Nov 84 pp 1, 3, 4

[Decree of the CPSU Central Committee and the USSR Council of Ministers "On the Awarding of the 1984 USSR State Prizes in the Area of Science and Technology"]

[Text] Having examined the proposal of the USSR Committee for [illegible] and State Prizes in Science and Technology attached to the USSR Council of Ministers, the CPSU Central Committee and the USSR [illegible] solve:

To award the 1984 USSR State Prizes to:

I. In Science

1. Academician Zhores Ivanovich Alferov, chief of a laboratory of the Physical Technical Institute imeni A.F. Ioffe of the USSR Academy of Sciences, Candidates of Physical Mathematical Sciences Alekseyev [illegible] and Samuil Girshevich Konnikov, senior scientific associates of the same institute, Doctor of Physical Mathematical Sciences Petr Georgiyevich Kel'dysh, chief of a sector of the Physics Institute imeni P.N. Lebedev of the USSR Academy of Sciences, Candidate of Physical Mathematical Sciences [illegible] Petrovich Bogatov, Candidates of Technical Sciences [illegible] and Vladimir Petrovich Durayev, senior scientific associates, Doctor of Physical Mathematical Sciences Boris Natanovich Sverdlov, junior scientific associates, workers of the same institute, Doctor of Technical Sciences [illegible] yevich Mil'vidskiy, deputy director of the State Scientific Research Mining Institute of the Rare Metals Industry, Candidate of Technical Sciences Lev'Markovich Dolginov, Larisa Vladimirovna [illegible] Georgiyevna Shevchenko, senior scientific associates of the same institute, for the series of works "Isoperiodic Heterostructures of Multicomponent (Quartenary) Solid Solutions of the Semiconductor [illegible]" published during 1971-1981.

2. Doctors of Physical Mathematical Sciences [illegible] Yevgeniy Ivanovich Kondorskiy, chiefs of chairs of Moscow State University imeni M.V. Lomonosov, Doctors of Physical Mathematical Sciences [illegible] Konstantinovich Zvezdin and Rudol'f Zinov'yevich Levitin, Candidate of Physical Mathematical Sciences Antonina Mikhaylovna [illegible]

associates, Doctors of Physical Mathematical Sciences Sergey Aleksandrovich Nikitin and Vladimir Ivanovich Sokolov, docents, associates of the same university, Corresponding Member of the USSR Academy of Sciences Igor' Yekhiyel'-yevich Dzyaloshinskiy, chief of a sector of the Institute of Theoretical Physics imeni L.D. Landau of the USSR Academy of Sciences, Doctor of Physical Mathematical Sciences Aleksandr Vasil-yevich Deryagin, chief of a laboratory of the All-Union Scientific Research Institute of Materials of Electronic Engineering, Doctor of Physical Mathematical Sciences Aleksey Andreyevich Yermakhyalov, chief of a laboratory of the Institute of Metal Physics of the Ural Scientific Center of the USSR Academy of Sciences, Doctor of Physical Mathematical Sciences Yuriy Pavlovich Irkhin, senior scientific associate of the same institute, Doctor of Physical Mathematical Sciences Eduard Leonovich Nagayev, chief of a laborabory of the All-Union Scientific Research Planning, Design and Technological Institute of Current Sources, for the Series of works "The Magnetism and Electron Structure of Rare Earth and Uranium Compounds," which were published duirng 1959-1982.

4. Academician Nikolay Nikolayevich Bogolyubov, director of the Joint Institute for Nuclear Research, Corresponding Member of the USSR Academy of Sciences Dmitriy Vasil'yevich Shirkov, chief of a sector of the same institute, Academician Anatoliy Alekseyevich Logunov, rector of Moscow State University imeni M.V. Lomonosov, for the series of works "The Renormalization Group Method in Field Theory," which was published during 1955-1956.

5. Academician of the Belorussian SSR Academy of Sciences Boris Vasil'yevich [illegible], rector of Gomel' State University, Doctor of Physical Mathematical Sciences Vladimir Davidovich Volosov, senior scientific associate of the State Optics Institute imeni S.I. Vavilov, Candidate of Physical Mathematical Sciences Valentin Gerogivevich Dmitriyev, chief of a department of a scientific research institute, Candidate of Physical Mathematical Sciences Saidazim Rustamovich Rustamov, chief of a laboratory of the same institute, Doctor of Physical Mathematical Sciences Anatoliy Pdtrovich Sukhorukov, professor of Moscow State University imeni M.V. Lomonosov, Candidate of Physical Mathematical Sciences Aleksandr Ivanovich Kuzrigin, docent of the same university, Candidate of Physical Mathematical Sciences Lev' Aleksandrovich Kulevskiy, senior scientific associate of the Institute of General Physics of the USSR Academy of Sciences, Candidate of Physical Mathematical Sciences Al'gis-Pyatras Styapovich Piskarskas, chief of a chair of Vilnius State University imeni V. Kapsukas, Candidate of Physical Mathematical Sciences Timurbek Usmanov, chief of a laboratory of the Institute of Electronics imeni U.A. Arifov of the Uzbek SSR Academy of Sciences, Doctor of Physical Mathematical Sciences Gennadiy Izrailevich Freydman, chief of a laboratory of the Institute of Applied Physics of the USSR Academy of Sciences, for the series of works "Highly Efficient Nonlinear Frequency Conversion in Crystals and the Development of Adjustable Sources of Coherent Optical Radiation," which were published during 1963-1982.

6. Academician Il'ya Nesterovich Vekua, for the monograph "Nekotoryye Obshchiye Metody postroyeniya razlichnykh variantov teorii obolochek" [Some General Methods of the Construction of Different Versions of Shell Theory], which was published in 1982.

6. Doctor of Physical Mathematical Sciences Vladimir Mefod'yevich Matrosov, director of the Irkutsk Computer Center of the Siberian Department of the USSR Academy of Sciences, director of the work, Candidates of Physical Mathematical Sciences Stanislav Nikolayevich Vasil'yev and Ravil' Izmaylovich Kozlov, Candidate of Technical Sciences Leonid Yukelevich Anapol'skiy, chiefs of laboratories of the same computer center, Candidate of Technical Sciences Aleksandr Sergeyevich Zemlyakov, docent of the Kazan Aviation Institute imeni A.N. Tupolev, for the series of works "The Development of the Method of Lyapunov Vector Functions for the Analysis of the Stability and Other Dynamic Properties of Nonlinear Systems," which were published during 1962-1981.

7. Doctor of Geological Mineralogical Sciences Al'gimantas Antanovich Grigyalis, director of a sector of the Lithuanian Scientific Research Geological Prospecting Institute, director of the work, Doctor of Geological Mineralogical Sciences Vitautas Ionovich Iodkazis, director of a department, Doctor of Geological Mineralogical Sciences Povilas Iokubovich Suveyzdis, Candidate of Geological Mineralogical Sciences Aleksandras Iosovich Shlyaupa, senior scientific associates, workers of the same institute, Deputy Chief of the Lithuanian SSR Administration of Geology Artur Yanovich Birger, Yanis Al'fredovich Straume, chief geologist of the combined geological prospecting expedition of the same administration, Candidate of Geological Mineralogical Sciences Arnis Petrovich Brangulis, deputy general director of the All-Union Maritime Scientific Production Association of Engineering Geology, Candidate of Geological Mineralogical Sciences Vitautas Pyatrovich Vonsavichyus, chief geologist of the Lithuanian SSR Administration of Geology, Kal'ya Al'fredovich Stumbur, chief geologist of the Kaela Geological Expedition of the Estonian SSR Administration of Geology, Kal'Ferdinandovich Kayak, senior geologist of the same administration, Candidate of Geological Mineralogical Sciences Vyayno Aleksandrovich Puure, director of a sector of the Institute of Geology of the Estonian SSR Academy of Sciences, for the comprehensive geological study of the territory of the Baltic region of the USSR and the compilation of composite geological maps with a scale of 1:500,000.

8. Doctors of Chemical Sciences Svetlana Mikhaylovna Avayeva and Sergey Dmitriyevich Varfolomeyev, chiefs of departments, Doctor of Biological Sciences German Aleksandrovich Kochetov, deputy chief of a department, Doctor of Biological Sciences Natal'ya Konstantinovna Nagradova, senior scientific associate, workers of the interfaculty problem scientific research laboratory of molecular biology and bioorganic chemistry of Moscow State University imeni M.V. Lomonosov, Doctor of Biological Sciences Andrey Dmitriyevich Vinogradov, Doctor of Chemical Sciences Yevgeniy Sergeyevich Severin, professors of the same university, Doctor of Chemical Sciences Vladimir Konstantinovich Antonov, chief of a laboratory of the Institute of Bioorganic Chemistry imeni M.M. Shemyakin of the USSR Academy of Sciences, Corresponding Member of the USSR Academy of Sciences Radiy Mikhaylovich Khomutov, deputy director of the Institute of Molecular Biology of the USSR Academy of Sciences, Doctor of Chemical Sciences Marat Yakovlevich Karpeyskiy, chief of a laboratory of the same institute, Doctor of Chemical Sciences Anatoliy Alekseyevich Klesov, chief of a laboratory of the Institute of Biochemistry imeni A.N. Bakh of the USSR Academy of Sciences, Doctor of Chemical Sciences Boris Ivanovich Kurganov, chief of a laboratory of the Vitaminy Scientific Production Association, Doctor of Chemical

Sciences Ol'ga [illegible] Lavrik, senior scientific associate of the Novosibirsk Institute of Organic Chemistry of the Siberian Department of the USSR Academy of Sciences, for the series of works "The Chemical Principles of Biological Catalysis," which were published during 1964-1982.

9. Corresponding Member of the USSR Academy of Sciences Raisa Georgiyevna Butenko, chief of a laboratory of the Institute of Plant Physiology imeni K.A. Timiryazev of the USSR Academy of Sciences, Candidates of Biological Sciences [illegible] Borisovna [illegible], Natal'ya Nikolayevna Dmitriyeva and Aleksandr Sergeyevich Popov, senior scientific associates of the same institute, Academician of the Ukrainian SSR Academy of Sciences Konstantin Merkur'yevich Sytnik, director of the Institute of Botany imeni N.G. Kholodnyy of the Ukrainian SSR Academy of Sciences, Doctor of Biological Sciences Yuriy Yur'yevich Gleba, chief of a department, Candidates of Biological Sciences Igor' Kliment'yevich Komarnitskiy and Vladimir Anatol'yevich Sidorov, senior scientific associates, workers of the same institute, Candidate of Agricultural Sciences Vladimir Andreyevich Vitenko, director of the Ukrainian Scientific Research Institute of Potato Growing of the Southern Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin, Candidate of Biological Sciences Anatoliy Andreyevich Kuchko, chief of a group of the same institute, for the series of works "The Development of the Basic Principles of the Cellular [illegible] of Plants," which were published during 1964-1982.

10. Doctor of Historical Sciences Valentin Vasil'yevich Sedov, chief of a sector of the Institute of Archaeology of the USSR Academy of Sciences, for the monograph "Vostochnyye Slavyane v VI-XIII vv." (The Eastern Slavs During the 6th-13th Centuries), which was published in 1982.

11. Doctor of Economic Sciences [illegible], for the monograph "Vneshnyaya ekspansiya kapitala: istoriya i sovremennost'" (The Foreign Expansion of Capital: The History and the Present), which was published in 1982.

12. Doctor of Juridical Sciences Igor' Ivanovich Karpets, director of the All-Union Institute for Study of the Causes and the Elaboration of Measures on the Prevention of Crime, Corresponding Member of the USSR Academy of Sciences Vladimir Nikolayevich Kudryavtsev, director of the Institute of State and Law of the USSR Academy of Sciences, Doctor of Juridical Sciences Aleksandr Maksimovich Yakovlev, chief of a sector of the same institute, Doctor of Juridical Sciences [illegible] Kuznetsova, professor of Moscow State University imeni M.V. Lomonosov, Doctor of Juridical Sciences [illegible], professor of the Moscow Higher School of Militia, for the series of works "The Development of the Theoretical Principles of Soviet Criminology," which were published during 1961-1982.

13. Academician of the USSR Academy of Medical Sciences Andrey Dmitriyevich Ado, chief of a department of the Institute of Immunology, for the monograph "Obshchaya allergologiya" (General Allergology), which was published in 1978.

14. Doctor of [illegible] Sciences [illegible], chief of a sector of the Institute of High Temperatures of the USSR Academy of Sciences, [illegible] of the work,

Doctor of Chemical Sciences Lev'Veniaminovich Gurvich, chief of a department, Doctor of Chemical Sciences Vadim Andreyevich Medvedev, Candidate of Chemical Sciences Vladimir Stepanovich Yungman, chief of a laboratory, Candidates of Chemical Sciences Georgiy Andreyevich Bergman and Inessa Veniaminovna Veyts, Candidate of Technical Sciences Vladimir Aleksandrovich Khudyakov, senior scientific associates, workers of the same institute, Doctor of Technical Sciences Vyacheslav Yevgen'yevich Alemasov, chief of a chair of the Kazan Aviation Institute imeni A.N. Tupolev, Doctor of Technical Sciences Anatoliy Fedorovich Dregalin, professor of the same institute, Doctor of Chemical Sciences Vladimir Pavlovich Vasil'yev, chief of a chair of the Ivanovo Chemical Technology Institute, Doctor of Chemical Sciences Viktor Petrovich Kolesov, senior scientific associate of Moscow State University imeni M.V. Lomonosov, Candidate of Technical Sciences Georgiy Akapovich Khachkuruzov, senior scientific associate of the State Institute of Applied Chemistry, for the series of works "The Development of a System of Data on the Thermodynamic Properties of Individual Substances and the Products of Combustion," which were published during 1965-1982.

II. In Technology

1. Al'girdas Lyonovich Grishkyavichyus, director of the Vilnius Plant of Plastic Items, director of the work, Candidate of Technical Sciences Vitautas Pranovich Bernatonis, deputy director, Pyatras Ionovich Vizhaynishkis, chief engineer, Oleg Davydovich Kil'man and Gintautas Ionovich Shvyadas, chiefs of departments, Vladimir Ivanovich Petrov and Al'girdas-Vitautas Vladovich Sabalyauskas, designers of category 1, Antanas Lyaonovich Martinenas, extruder operator, workers of the same plant, Grigoriy Izrailevich Shapiro, chief of a department of the Plastik Scientific Production Association, for the development of highly productive automated waste-free processes of the processing of plastics with the use of robotics.

2. Yuriy Konstantinovich Agafonov and Gennadiy Petrovich Bystrov, chiefs of departments of the Main Tyumen Production Geological Administration, Viktor Vladimirovich Rozhdestvenskiy and Yevgrafiya Artem'yevna Teplyakov, chiefs of administrations, Candidate of Geological Mineralogical Sciences Faiz Zakiyevich Khafizov, chief of the Tyumen Thematic Expedition, workers of the same main administration, Anatoliy Mikhaylovich Brekhuntsov, general director of the Urengoy Production Geological Association for the Prospecting of Petroleum and Gas, Valentin Ivanovich Ivanov, chief Engineer of the Yamalo-Nenets Production Geological Association for Geophysical Operations, Candidate of Geological Mineralogical Sciences Nariman Khasanovich Kulakhmetov, deputy director of the Western Siberian Scientific Research Institute of the Geological Prospecting for Petroleum, Doctor of Geological Mineralogical Sciences Vladimir Il'ich Shpil'man, chief of a department of the same institute, Candidate of Geological Mineralogical Sciences Vladimir Konstantinovich Monastyrev, director of the Western Siberian Department of the All-Union Scientific Research Institute of Geophysical Methods of Prospecting, Candidate of Geological Mineralogical Sciences Oktyabr' Amirovich Remeyev, deputy chief of a subdepartment of the USSR State Planning Committee, Candidate of Geological Mineralogical Sciences Arkit Vasil'yevich Tyan, chief specialist of the Interdepartmental Territorial Commission for Questions of the Development of the Western Siberian Petroleum and Gas Complex, for the discovery and rapid preparation for commercial development of the Yamburgskiy gas condensate deposit.

3. Academician of the USSR Academy of Medical Sciences Sergey Mikhaylovich Navashin, director of the All-Union Scientific Research Institute of Antibiotics, director of the work, Candidate of Biological Sciences Yuriy Lazarevich Bartoshevich, deputy director, Doctor of Chemical Sciences Yelena Mikhaylovna Savitskaya, former director of a laboratory, Doctor of Biological Sciences Mikhail Mikhaylovich Levitov, scientific consultant, Candidate of Chemical Sciences Polina Srul'yevna Nys, senior scientific associate, Sof'ya Sergeyevna Smirnova, deputy chief of a shop of an experimental plant, workers of the same institute, Doctor of Technical Sciences Ado Il'marovich Kestner, chief of chair of Tallinn Polytechnical Institute, Ninel' Mikhaylovna Matokaina, chief engineer of the Riga Plant of Medicinal Compounds, Candidate of Technical Sciences Yuriy Nikolayevich Mileshin, deputy chief of a laboratory of the Shranci Plant of Medicinal Compounds, Candidate of Chemical Sciences Vitautas-Yuozapas Kavatono Shvyadas, senior scientific associate of the interfaculty problem scientific research laboratory of molecular biology and bioorganic chemistry at Moscow State University imeni M.V. Lomonosov, for the development of the scientific principles, the development of the technology and the industrial assimilation of biocatalytic processes of the obtaining of the compounds for the production of beta-lactam antibiotics.

4. Gennadiy Mikhaylovich Zavtsev, chief of the Kalinin Production Laboratory of the Center for the Scientific Organization of Labor and the Management of Forestry, director of the work, Boris Fomich Ivanov and Oleg Arsen'yevich Gorbunov, chief specialists, Nina Sergeyevna Larina, chief of a sector, staff members of the same laboratory, Leonid Vasil'yevich Galeyev, chief forest engineer of the Kalinin Oblast Production Association of Interfarm Timber Management, Ivan Yegorovich Filippov, director of the Kalashnikovo Planning and Forestry Tekhnikum, Vladimir Mikhaylovich Shadar', deputy chief of the Kalinin Administration of Forestry, Leonid Semenovich Khrenov, chief forest engineer, Petr Ivanovich Chikizov, chief of a department, Mikhail Nikolayevich Viktorenko, director of the Nelidovo Timber Management, Yevgeniy Yefimovich Shtepenko, director of the Maksatikha Timber Management, workers of the same administration, for the development and introduction of the technology of producing high quality seeds of coniferous species at specialized complexes for the expanded reproduction of timber resources.

5. Anatoliy Viktorovich Golubenko, bulldozer operator of the administration of operation of the Great Stavropol Canal, Ivan Vasil'yevich Dubrovskiy, chief of the Stavropol'gidrostroy Production Cost Accounting Construction and Installation Association, Nikolay Grigor'yevich Sidnetskiy, foreman of Mobile Mechanized Column No 10, Grigoriy Stepanovich Taranyuk, senior construction superintendent of Mobile Mechanized Column No 6, workers of the same association, Yuriy Aleksandrovich Maksimov, director of the North Caucasian State Institute for the Planning of Water Resource and Land Reclamation Construction, Ivan Vasil'yevich Pimen, deputy chief engineer of the same institute, RSFSR minister of land reclamation and water Resources Nikolay Nikolayevich Kolesnikov, Vladimir Georgiyevich Nekrasov, deputy chairman of the Executive Committee of the Stavropol Kray Soviet of People's Deputies, Vladimir Nikolayevich Gorbenko, chief of construction of the Gorkiy Subway, Nikolay Leont'yevich Kuznetsov, chief of the Stavropol Krav Production Administration of Land Reclamation and Water Resources, Aleksandr Mikhaylovich Chepelev, link leader

of the Kolkhoz imeni Vostok of Aleksandrovskiy Rayon of Stavropol Kray, for the organization of a zone of highly efficient agricultural production on the basis of the great Stavropol Canal.

6. Academician of the USSR Academy of Medical Sciences Irina Nikolayevna Blokhina, director of the Gorkiy Scientific Research Institute of Epidemiology and Microbiology, Candidate of Medical Sciences Nina Sergeyevna Zakhar'yevskiy, deputy director, Candidate of Biological Sciences Irina Aleksandrovna Kiseleva, director of a department, Vladislav Aleksandrovich Chadayev, former chief of a shop of the enterprise of bacterial preparations, staff members of the same institute, Doctors of Medical Sciences Tat'yana Vasil'yevna Golosova and Nina Vasil'yevna Semidova, Candidate of Medical Sciences Valentin Mikhaylovich Rusanov, chiefs of laboratories of the Central Scientific Research Institute of Hematology and Blood Transfusion, Doctor of Medical Sciences Grigoriy Fedoseyevich Papko, Candidate of Medical Sciences Marina Antonovna Krokhina, senior scientific associates, Ella Nikolayevna Lukovkina, deputy chief physician of a tranfusion station, workers of the same institute, Doctors of Medical Sciences Anatoliy Ioffiyevich Riseiet and Anatoliy Aleksandrovich From, for the development and extensive introduction in medical practice of anti-staphylococcus immune compounds and the scientific substantiation of the immunotherapy of Staphylococcus infections.

7. Academician of the USSR Academy of Medical Sciences Nokolay Nikodimovich Malinovskiy, deputy director of the All-Union Scientific Center of Surgery of the USSR Academy of Medical Sciences, director of the work, Doctor of Medical Sciences Boris Alekseyevich Konstantinov, chief of a department, Candidate of Medical Sciences Sergey Leonidovich Dreznshkevich, senior scientific associate, Candidate of Medical Sciences Aleksey Sergeyevich Ivanov, junior scientific associate, Candidate of Medical Sciences Aleksey Sergeyevich Ivanov, junior scientific associate, workers of the same scientific center, Doctor of Medical Sciences Veronika Aleksandrovna Bykova, professor of the Central Institute of the Advanced Training of Physicians, Doctor of Technical Sciences Valeriy Mikhaylovich Sagalevich, professor of the Moscow Higher Technical School imeni N.E. Bauman, Candidate of Technical Sciences Nikolay Nikolayevich Zavalishin, junior scientific associate of the same school, Candidate of Technical Sciences Yuriy Aleksandrovich Ferisov, chief of a special design bureau of a chemical combine, Vyacheslav Mikhaylovich Bartoshkin, chief of a laboratory of the same design bureau, Doctor of Medical Sciences Grigoriy Iosifovich Tsukerman, chief of a department of the Institute of Cardiovascular Surgery imeni A.N. Bakulev of the USSR Academy of Medical Sciences, Doctor of Medical Sciences Boris Aleksandrovich Fursov, director of a group of the same institute, for the scientific development and introduction in clinical practice of biological protheses of heart valves.

8. Mikhail Vladimirovich Gerasko, operator of a roofing machine of the Belorussian Association for the Production of Heavy Trucks imeni 60-letiya Velikogo Oktyabrya, Georgiy Aleksandrovich Ivashevich, deputy general director of the same association, Doctor of Technical Sciences Anatoliy Konstantinovich Grigor'yev, chief of a chair of Leningrad Polytechnical Institute imeni M.I. Kalinin, Candidate of Technical Sciences Genrikh Gavriilovich Sembratov, director of a scientific research technological institute, Boris Mikhaylovich

[illegible] and Vasiliy Pavlovich Nadervel', chiefs of departments, Candidate of Technical Sciences Boris Gustavovich Levin, former chief of a department, staff members of the same institute, Candidate of Technical Sciences Viktor Yefimovich Pivnev, director of a design bureau of technological supply, Aleksandr Vasil'yevich Shuvayev, deputy general director of the Kama Association for the Production of Heavy Trucks, Gennadiy Alekseyevich Sharapov, shift foreman of a machine building plant, Boris Pavlovich Ruzaykin, adjuster of the sixth category, for the development and introduction in machine building of a set of [illegible] and automated equipment for the precision cold pressure forming of [illegible] gears.

6. Candidates of Technical Sciences Veniamin L'vovich Raskin and Boris Grigor'evich [illegible], chiefs of design bureaus of the Uralmash Production Association, Vladimir Vladimirovich Koshkarev, chief project engineer, Mikhail Karpovich [illegible], engineer-technologist of the first category, workers of the same association, Candidate of Technical Sciences Petr Ivanovich Slizkiy, chief designer of mining equipment of the Novo-Kramatorskiy mashinostroitel'nyy Production Association, USSR First Deputy Minister of the Coal Industry Mikhail Ivanovich Shchadov, Doctor of Technical Sciences Konstantin Yefimovich [illegible]ovskiy, deputy director of the Institute of Mining imeni A.A. Skochinskiy, Konstantin Vasil'yevich Vitkovskiy, chief engineer of the Krasnoyarskugol' Production Association for Coal Mining, Nikolay Zakharovich Volod'kov, excavator operator of the Nazarovskiy open pit of the same association, Vladimir Petrovich Bosedin, general director of the Eastern Siberian Production Association for Coal Mining, Candidate of Technical Sciences Teodor Zel'manovich [illegible], chief of a department of All-Union Scientific Research and Planning and Design Institute for Automatic Electric Drive in Industry, Agriculture and Transport, Vasiliy Mikhaylovich Minichev, chief of a department of the Leningrad Elektrosila Electrical Machine Building Production Association, for the development of walking excavators of a large unit power and the introduction on their basis of conveyer-less systems of the working of coal deposits of the Eastern regions of the country.

7. Candidate of Technical Sciences Ivan Nikanorovich Fil'kin, chief designer of the Voronezh Production Association for the Production of Heavy-Duty Power Presses, director of the work, Aleksandr Il'ich Kruk, deputy general director, Candidates of Technical Sciences Vladimir Il'ich Sokov and Vladislav Nikolayevich Tarasov, Anatoliy Dmitriyevich Galakhov, chiefs of departments, Pavel [illegible]enkov, leader of a brigade of electricians, workers of the same association, doctor of technical sciences Yevgeniy Nikolayevich Lanskiy, chief engineer of the Moscow Institute of Machine Tool and Tool Building, Yuriy [illegible]ovich Furmanov, chief engineer of the chassis pressing plant of the Production Association for the Production of Heavy Trucks, Vasiliy Alekseyevich [illegible], adjuster of the sixth category of the same plant, for the development and introduction in industry of heavy-duty and single-design power presses of [illegible]-forming lines and, on their basis, automatic lines and complexes.

8. Valeriy Borisovich Gordin, director of the Norilsk Production Association [illegible] Production, Anatoliy Ivanovich Garayev, chief engineer of projects of the All-Union Scientific Research and Planning and Design Institute for the [illegible]ment of Gas Field Equipment, Candidate of Technical Sciences Aleksey

Mikhaylovich Zinovich, Director of the All-Union Scientific Research Institute for the Construction of Main Natural Gas Pipelines, Candidate of Technical Sciences Viktor Vasil'yevich Spiridonov, chief of a department of the same institute, Candidates of Technical Sciences Viktor Anat'yevich Konovalov and Aleksandr Dmitriyevich Sedykh, chiefs of administrations of the Ministry of the Gas Industry, Vladimir Valentinovich Luk'yanov, manager of the power system of the Norilsk Mining and Metallurgical Combine imeni A.P. Zavenyagin, Candidate of Geological Mineralogical Sciences Vasiliy Dmitriyevich Nakaryakov, general director of the Yeniseysk Production Association for the Prospecting of Petroleum and Gas, Yefim Mikhaylovich Pen'kovskiy, deputy chief of a main administration of the Ministry of Construction of Petroleum and Gas Industry Enterprises, Yuriy Vasil'yevich Strakhov, chief of a laboratory of a mobile trust of the Specialized Petroleum and Gas Supply Lines Construction Administration, Doctor of Geological Mineralogical Sciences Dmitriy Borisovich Talvirskiy, chief of a sector of the All-Union Scientific Research Institute of the Geological Prospecting for Petroleum, Grigoriy Andreyevich Uskov, chief of the Krasnoyarsk Okrug administration of the USSR State Committee for Supervision of Safe Working Practices in Industry and for Mine Supervision, for the formulation of scientific and technical solutions, which ensured the building of a set of structures for the reliable gas supply of the Norilsk Mining and Metallurgical Combine imeni A.P. Zavenyagin.

12. Deputy Minister of Construction of Petroleum and Gas Industry Enterprises Grigoriy Nikolayevich Sudobin, Doctor of Technical Sciences Oleg Maksimovich Ivantsov, chief of a main administration of the same ministry, Nikolay Mikhaylovich Pavlov, director of the Nipiorgneftegazstroy Scientific Research and Planning and Technological Institute [not further identified], Doctor of Technical Sciences Mikhail Petrovich Karpenko, chief of a department of the All-Union Scientific Research Institute for the Construction of Main Natural Gas Pipelines, Feliks Valeyevich Mukhamedov, chief of the Main Territorial Administration for the Construction of Main Pipelines in the Eastern Regions of the Country, Anatoliy Antonovich Rokoshetov, chief of Construction and Installation Administration No 4 of the Severtruboprovodstroy Trust, Ivan Yegorovich Sukharev, manager of the Priob'truboprovodstroy Trust, Candidate of Technical Sciences and Deputy Minister of the Gas Industry Stepan Romanovich Derezhov, Vladimir Ivanovich Khalatin, chief of an administration of the same ministry, Natan Mikhaylovich Mitsenmakher, chief engineer of projects of the Southern State Scientific Research and Planning and Design Institute of the Gas Industry, Doctor of Technical Sciences Petr Petrovich Borodavkin, chief of a chair of the Moscow Institute of the Petrochemical and Gas Industry imeni I.M. Gubkin, Georgiy Vasil'yevich Ershov, deputy chief of the All-Union Industrial Association for Gas Production in Tyumen Oblast, for the development and introduction of methods of the high-speed flow-line construction of the Urengoy-Pomary-Uzhgorod transcontinental gas pipeline, which ensured its early placement into operation.

13. Doctor of Technical Sciences Oleg Ivanovich Aven, chief of a laboratory of the Institute of Problems of Control (Automation and Remote Control), Doctors of Technical Sciences Akop Gasparovich Mamikonov and Vladimir Lazarevich Epshteyn, chiefs of laboratories, associates of the same institute, Corresponding Member of the USSR Academy of Sciences and USSR Deputy Minister of

Higher and Secondary Specialized Education Igor' Nikolayevich Makarov, Doctor of Technical Sciences Igor' Nikolayevich Skopin, deputy chief of a department of the Computer Center of the Siberian Department of the USSR Academy of Sciences, Doctor of Physical and Mathematical Sciences Stepan Borisovich Mikhailov, director of the Central Scientific Research and Planning and Technological Institute of the Organization and Techniques of Management, Doctor of Economic Sciences Robert Sergeyevich Vasnev, deputy director, Doctor of Technical Sciences Anatoliy Sofronovich Zaytsev, chief of a laboratory, associates of the same institute, Candidate of Technical Sciences Vitaliy Il'ich Shatilov, deputy director of the Institute of Computer Center V.M. Glushkov of the Ukrainian SSR Academy of Sciences, Doctor of Technical Sciences Vitaliy Semenovich Mukha, rector of the Higher School of the Trade Union Movement [illegible] M. Gorkiy, Fedir Ivanovych Sidorov, deputy chief of a department of [illegible] of the USSR State Committee for Science and Technology, for the elaboration of the theoretical principles, the development and extensive introduction of organizational management systems with the use of computers.

In [illegible] Yurgutis and Yuriy [illegible] Gintaras, chiefs of sectors of the Institute of Space Research of the Lithuanian Academy of Sciences, Candidate of Technical Sciences Yan L'vovich Alpert, chief of a department, Candidate of Technical Sciences Yan [illegible] Chernobrov, chief of a laboratory, Valeriy Viktorovich Fedun, deputy chief of a department, associates of the same institute, corresponding member of the Academy of Sciences of the Tatarskaya Republic Karlheinz Gertrudovich Muller, responsible for basic research at Nizhnekamskneftekhim Petrochemical Enterprise, Candidate of Technical Sciences Lavrik Tymofiyovych Pilipiv, deputy general director of the Natural Resource Remote Sensing Research and Production Center, Candidate of Geographical Sciences Lilly Sedrykovna Kel'ner, chief of a department of the same center, Candidate of Technical Sciences Yuriy Stanislavovich Antimirov, chief of a laboratory of Moscow State University imeni M.V. Lomonosov, Doctor of Geological Mineralogical Sciences Vladimir Viktorovich Kozlov, chief geologist of the Geological Production Association for the Regional Study of the Geological structure of the Territory of the Country, for the development and introduction in the national economy of methods and equipment of multiregion photography for the study of the natural resources of earth from space.

In Deputy Minister of the Electrical Equipment Industry Yuriy Alekseyevich Nikitin, director of the work, Zhanna Mikhaylovna Novakovskaya, chief engineer of the [illegible], Doctor of Physical Mathematical Sciences Igor' Borisovich Pabashov, deputy director of the All-Union Scientific Research Planning and Design and Technological Institute of the Cable Industry, Candidate of Technical Sciences Vitaliy Aleksandrovich Nesterov, and Vitol'd Alekseyevich Bachinskiy, chiefs of departments, Yuriy Nikolayevich Metal'nikov, chief of a laboratory, associates of the same institute, Vasiliy Aleksandrovich Ponomarev, General director of the Kiev Production Association of Relay and Automation, Candidate of Technical Sciences Roman Yevelevich Boguslavskiy, chief of a department of the All-Union Planning, design and technological bureau of relay and automation, Anatoliy Demenovich Skorokhvatov, Senior Expert of an administration of the USSR State Committee for Science and Technology, Doctor of Physical Mathematical Sciences Vasiliy Yakovlevich Arsenin, chief of a department of the Institute of Applied Mathematics Imeni M.V. Keldysh of the USSR Academy of

Sciences, Doctor of Medical Sciences Nikolay [illegible] director of the Scientific Research Institute [illegible] of Medical Sciences, Candidate of Medical Sciences [illegible] Vavilov, chief of a laboratory of the same institute, [illegible] the base design of a number of [illegible] instruments [illegible] unified system of their metrological support.

16. Doctor of Technical Sciences [illegible] chair of the Moscow Institute of Electronic [illegible] nical Sciences, Yevgeniy Viktorovich [illegible], [illegible] Sciences Yevgeniy Semenovich Yermakov, [illegible] Yegorovich Minaychev, docents, associates of the [illegible] of Technical Sciences Mikhail Ivanovich Vinogradov [illegible] Kurbatov, Leonid [illegible], chief of [illegible] research institute, Candidate of Technical Sciences [illegible] skiy, senior scientific associate, [illegible] associates of the same institute, Doctor of [illegible] Yefraim Mendeleyevich Reykhrudel', [illegible] sity imeni M.V. Lomonosov, Doctor of Technical [illegible] Smirnitskaya, senior scientific associate [illegible] velopment and introduction in industry of [illegible] pumps and high-vacuum means of technological and [illegible] electronic engineering.

17. Arkadiy Gavrilovich Bain, chief of a department [illegible] bureau, Dmitriy Filippovich [illegible], chief [illegible] man Dmitriyevich Borisov, deputy chief of [illegible] attached to the Ministry of the Maritime Fleet [illegible] chief state inspector of the same administration, [illegible] Moisey Iosifovich Fishel'son, chief of a chair of [illegible] Aviation Engineers imeni [illegible], [illegible] chief of a department of a problem laboratory, Candidate [illegible] Vasiliy Grigor'yevich Glushnev, docent, workers of the [illegible] Mikhaylovich Losev, marine hydrologist of the Murmansk [illegible] Company, Candidate of Technical Sciences [illegible] scientific associate of the State Hydrologic Institute, [illegible] Balabayev and Nikolay Ivanovich Komov, senior engineers [illegible] Antarctic Scientific Research Institute, for the [illegible] and the development of on-board instruments for [illegible] ness of sea and fresh water ices and their [illegible]

18. Doctor of Technical Sciences Grigoriy [illegible] consultant of the All-Union Scientific Research [illegible] ics and Mine Surveying, director of the work, [illegible] Konstantin Arkad'yevich [illegible], chief of a department, [illegible] cal Sciences Fedor Petrovich Glushikhin and [illegible] tor of Technical Sciences Nikolay [illegible] Candidate of Technical Sciences [illegible] chief of a laboratory, Candidate of Technical Sciences [illegible] Yurich, senior scientific associate, workers of the same [illegible] Technical Sciences [illegible], chief of [illegible] grad Mining Institute imeni G.V. Plekhanov, [illegible]

Gennadiy Ignat'yevich Gritsko, director of the Institute of Coal of the Siberian Department of the USSR Academy of Sciences, Corresponding Member of the USSR Academy of Sciences Yevgeniy Ivanovich Shemyakin, director of the Institute of Mining of the Siberian Department of the USSR Academy of Sciences, Doctor of Technical Sciences Gennadiy Alekseyevich Katkov, chief of a laboratory of the Institute of Mining imeni A.A. Skochinskiy, for the development and construction of models of geomechanical processes with the use of equivalent materials and the use of these models when performing mining operations and underground construction.

19. Lev' Moiseyevich Reznikov, general director of the Kemerovo Production Association for Coal Mining, director of the work, Candidate of Economic Sciences Lev' Mikhaylovich Gumenyuk, director for economics, Viktor Ivanovich Kuznetsov, chief engineer, Nikolay Fedorovich Grigor'yev, director of the Open Pit imeni 50-letiya Oktyabrya, Aleksandr Yevgen'yevich Denisov, director of the Listvyanskiy Open Pit, Gakiy Tagirovich Fazalov, director of the Mezhdurechenskiy Open Pit, Vyacheslav Nikolayevich Kabchuk, leader of a multiple-skill brigade of the Open Pit imeni Vakrushev, workers of the same association, Candidate of Technical Sciences Boris Georgiyevich Aleshin, chief engineer of an administration of the USSR Ministry of Coal Industry, Ivan Ivanovich Prigornitskiy, chief of the Novokolbinskiy Open Pit Construction Administration of the Kuz'assshakhtostroy Combine, Valentin Il'ich Bukhtiyarov, leader of a brigade of installers of Belovo Shaft Building and Installation Administration No 5 of the same combine, Ivan Stepanovich Perov, chief of the Kuzbass Installation and Adjustment Administration of Kuzbassenergougol' [not further identified], Candidate of Technical Sciences Vladislav Mikhaylovich Petrov, director of the State Institute for the Planning of Mines, for the development in the Kuzbass of a large industrial and socioeconomic complex for the strip mining of coal (including coking coal).

20. Doctor of Technical Sciences and Deputy Chairman of the USSR State Committee for Science and Technology Sergey Petrovich Yefimenko, Stanislav Nikolayevich Ignat'yev, director of the Donetsk Metallurgical Plant imeni V.I. Lenin, Aleksey Mikheyevich Kamardin, chief engineer, Aleksey Grigor'yevich Kuzub, chief of a department, Candidate of Technical Sciences Yevgeniy Nikiforovich Skladanovskiy, chief of a laboratory, Candidate of Technical Sciences Vasiliy Vasil'yevich Stepanov, assistant chief of a shop, workers of the same plant, Vladimir Petrovich Tereshchenko, chief of a department of the Donetsk Oblast Committee of the Communist Party of the Ukraine, Candidate of Technical Sciences Stanislav L'vovich Yaroshevskiy, chief of a laboratory of the Donetsk Scientific Research Institute of Ferrous Metallurgy, Anatoliy Al'fonsovich Yarmal', chief of a group of the same institute, Gennadiy Yevgen'yevich Goryaynov, director of the State Scientific Research and Planning Institute of the Metallurgical Industry (Giprostal'), Yuriy Grigor'yevich Bannikov, deputy chief of an administration of the Ukrainian SSR ministry of Ferrous Metallurgy, Doctor of Technical Sciences Viktor Ivanovich Machikin, chief of a chair of Donetsk Polytechnical Institute, for the development and introduction at the Donetsk Metallurgical Plant imeni V.I. Lenin of the technology and a set of equipment for the smelting of pig iron with the blowing of pulverized coal fuel into the hearth of blast furnaces, which provided a significant saving of coke.

21. Candidate of Technical Sciences and USSR Deputy Minister of Ferrous Metallurgy Aleksandr Andreyevich Kugushin, Mikhail Vasil'yevich Malakhov, chief of a department of an administration of the same ministry, Vladimir Tikhonovich Uvarov, steelmaker-gunite sprayer of the Western Siberian Metallurgical Combine imeni 50-letiya Oktyabrya, Candidate of Technical Sciences Anatoliy Vasil'yevich Lakuntsov, chief converter operator of the Cherepovets Metallurgical Combine imeni 50-letiya SSSR, Candidate of Technical Sciences and Ukrainian SSR Deputy Minister of Ferrous Metallurgy Stanislav Tikhonovich Pliskanovskiy, Doctor of Technical Sciences Fedor Yegorovich Dolzhenkov, director of the Donetsk Scientific Research Institute of Ferrous Metallurgy, Candidate of Technical Sciences Yevgeniy Dmitriyevich Shtepa, chief of a department of the same institute, Candidates of Technical Sciences Izrail' Abramovich Yuzefovskiy and Oleg Nikolayevich Chemeris, senior scientific associates of the All-Union State Institute of Scientific Research and Design Operations of the Refractory Industry, Vyacheslav Vasil'yevich Semin, chief steel smelter of the Novolipetsk Metallurgical Combine imeni Yu.V. Andropov, Anatoliy Ivanovich Andryushchenko, chief of a laboratory, Yuriy Alekseyevich Minin, senior steelmaker, workers of the same combine, for the development and introduction of a cyclone-spray method and a set of equipment for the gunite spraying of the lining of concerters, which provided a significant increase of the efficiency of the oxygen-converter production of steel.

22. Academician Askar Minliakhmedovich Kunayev, president of the Kazakh SSR Academy of Sciences, Yuriy Sergeyevich Bragin, chief specialist of the All-Union Industrial Association of Metallurgical Enterprises, Doctor of Technical Sciences Leonid Andreyevich Smirnov, deputy director of the Ural Scientific Research Institute of Ferrous Metals, Candidate of Technical Sciences Viktor Ignat'yevich Gladyshev, chief of a laboratory of the same institute, Candidate of Technical Sciences Mikhail Mikhaylovich Shumov, senior scientific associate of the Central Scientific Research Institute of Ferrous Metallurgy imeni I.P. Bardin, Candidate of Technical Sciences Aleksandr Vasil'yevich Smorodinnikov, director of the Ural Scientific Research and Planning Institute of the Concentration and Mechanical Processing of Minerals (Uralmekhanobr), Candidate of Technical Sciences Makhmut Akbiyev, director of the Karaganda Metallurgical Combine, Candidate of Technical Sciences Vladislav Viktorovich Yemshanov and Vladimir Aleksandrovich Mirko, deputy chief engineers, Georgiy Leonidovich Tsimbal, chief of a central plant laboratory, Vladilen Nikolayevich Burgov, production chief, workers of the same combine, Nikolay Nikolayevich Yenin, metallurgical engineer, for the development and introduction in the metallurgical industry of the technology of the processing of phosphorous iron ore raw materials, which ensures the production of highly efficient types of sheet metal and the possibility of putting into use depostis of these raw materials, which have previously not been worked.

23. Al'bert Abramovich Avakimov, manager of Bridge Construction Trust No 8 of the Main Administration for Bridge Construction, Candidate of Technical Sciences Ivan Danilovich Rasskazov, manager of Bridge Construction Trust No 9 Leonid Solomonovich Blinkov, manager of Bridge Construction Trust No 10, Mikhail Aleskandrovich Koshelev, chief of a special design bureau, Vladimir Stepanovich Chakhlov, deputy chief of a special design bureau, workers of the same main administration, Aleksandr Vladimirovich Chernyshev, chief of a main administration of the Ministry of Transport Construction, Vladislav Al'bertovich

Koter, deputy chief of a main administration of the same ministry, Vadim Borisovich Brusilovskiy, chief project engineer of the State Institute for Research and Planning of Bridges, Grigoriy Nikolayevich Gugutsidze, chief of a laboratory of the All-Union Scientific Research institute of Transport Construction, Candidate of Technical Sciences Yevgeniy Arkad'yevich Tyulenev, senior scientific associate of the same institute, Vladimir Aleksandrovich Vasil'yev, chief engineer of a main administration, Aleksandr Borisovich Chumakov, chief of a section of the same administration for new methods of the construction of bridges under the difficult conditions of the Baykal-Amur Railway Line.

24. Doctor of Technical Sciences Vladimir Mikhaylovich Moskvin, senior scientific associate-consultant of the Scientific Research Institute of Concrete and Reinforced Concrete, director of the work, Doctor of Technical Sciences Sergey Nikolayevich Alekseyev, chief of a laboratory, Doctor of Technical Sciences Fedor Mikhaylovich Ivanov, Candidate of Technical Sciences Yevgeniy Andreyevich Guzeyev, chiefs of sectors, Candidate of Technical Sciences Abram Menas'yevich Podval'nyy, director of a group Associates of the same institute, Doctor of Chemical Sciences Viktor Borisovich Ratinov, professor of the Moscow Highway Institute, Doctor of Technical Sciences Aleksey Filippovich Polak, chief of a chair of the Ufa Petroleum Institute, Doctor of Technical Sciences Vladimir Ivanovich Babushkin, prorector of the Kharkov Institute of Construction Engineering, Doctor of Technical Sciences Grigoriy Ivanovich Gorchakov, chief of a chair of the Moscow Institute of Construction Engineering imeni V.V. Kuybyshev, for the formulation of the theory of the corrosion of concrete and reinforced concrete and the development on its basis of durable reinforced concrete components of mass construction.

25. Candidate of Technical Sciences Semen Semenovich Vaykhanskiy, director of the Kherson Pulp and Paper Plant, director of the work, Gennadiy Ivanovich Petrushkin, chief technologist, Sergey Yefimovich Utrobin, operator of a paper-making machine, workers of the same plant, Candidate of Technical Sciences Valeriy Fedorovich Nevolin, chief of a laboratory of the All-Union Scientific Production Association of the Pulp and Paper Industry, Candidate of Technical Sciences Moisey Rakhmel'yevich Kagan, senior scientific associate of the same association, Aleksandr Mikhaylovich Savin, deputy chief designer of the Kirovskiy zavod Production Association, Candidate of Technical Sciences Valeriy Nikolayevich Kurilov, chief designer, Yuriy Viktorovich Potapov, chief of a department of a planning and design bureau, workers of the same association, Candidate of Technical Sciences Mikhail Aleksandorvich Grigor'yev, chief of a laboratory of the Central Scientific Research Institute of Automobiles and Automobile Engines, Candidate of Technical Sciences Vladimir Viktorovich Kondratov, chief of a department of the TsNITA Scientific Production Association for Combustion Equipment of Engines, Aleksandr Nikolayevich Talyzin, chief engineer of the Livny Plant of Automotive Equipment, for the development and introduction in industry of the processing method of highly efficient filter types of paper and filtering devices of internal combustion engines.

26. Candidate of Technical Sciences Nikolay Ivanovich Antonov, general director of the Moscow Moloko Production Association, Natal'ya Georgiyevna Merkulova, deputy chief of a laboratory of the same association, Doctor of Technical

Sciences Vladimir Rudol'fovich Borovskiy, chief of a department of the Institute of Technical Thermal Physics of the Ukrainian SSR Academy of Sciences, Candidate of Technical Sciences Yuriy Fedorovich Snezhkin, senior scientific associate, Candidate of Technical Sciences Leonid Nikolayevich Grabov, chief of a department of a pilot design and technological bureau of the intensification of heat and mass transfer processes, associates of the same institute, Candidate of Technical Sciences Yuriy Fedorovich Zav'yalov, chief of a department of the All-Union Scientific Research Biotechnical Institute, Yelena Petrovna Kondrashova, senior scientific associate of the same institute, Lyudmila Ivanovna Mironenko, chief of the Administration of the Food Industry of the Executive Committee of the Krasnodar Kray Soviet of People's Deputies, Viktor Alekseyevich Zuyev, chief engineer of the same administration, Doctor of Technical Sciences Kalust Akopovich Kalunyanets, prorector of the Moscow Technological Institute of the Food Industry, Stepan Ivanovich Krupko, director of the Voroshilovgrad Canning Factory, Ivan Stepanovich Krizhanovskiy, chief engineer of a scientific production association for the planning and introduction of new equipment and advanced technology, the improvement of the organization of production and labor, for the development and introduction in industry of a technology of the waste-free production of new types of food products.

III. For Textbooks

For Higher Educational Institutions

1. Academician of the USSR Academy of Medical Sciences Nikolay Alekseyevich Lopatkin, director of the Scientific Research Institute of Urology, director of the work, Doctor of Medical Sciences Anatoliy Fedorovich Darenkov, Candidate of Medical Sciences Boris Matveyevich Krendel', deputy directors, Doctors of Medical Sciences Vladimir Georgiyevich Goryunov, Aleksandr Leonovich Shaoad and Elana Konstantinovna Yanenko, senior scientific associates, workers of the same institute, Doctors of Medical Sciences Valentin Yakovlevich Simonov and Yevsey Borisovich Mazo, professors of the Second Moscow Medical Institute imeni N.I. Pirogov, Doctor of Medical Sciences Anatoliy Pavlovich Yerokhin, docent, Candidate of Medical Sciences Aleksey Vladimirovich Morozov, graduate student, associates of the same institute, Doctor of Medical Sciences Vladimir Yevgen'yevich Rodoman, chief of a course of the University of Friendship of Peoples imeni Patrice Lumumba, Doctor of Medical Sciences Igor' Nikolayevich Kuchinskiy, for the textbook "Urologiya" [Urology], which was published in 1982 (second edition).

2. Doctor of Technical Sciences Nikolay Nikolayevich Maslov, chief of a chair of the Moscow Highway Institute, for the textbook "Osnovy inzhenernoy geologii i mekhaniki gruntov" [Principles of the Engineering Geology and Mechanics of Soils], which was published in 1982.

3. Doctor of Technical Sciences Yevgeniya Yulianovna Orlova, professor of the Moscow Chemical Technology Institute imeni D.I. Mendeleyev, for the textbook "Khimiya i tekhnologiya brizantnykh vzryvchatykh veshchestv" [The Chemistry and Technology of High Explosives], which was published in 1981 (third edition).

4. Doctor of Biological Sciences Boris Petrovich Tokin, Leningrad State University imeni A.A. Zhdanov, for the textbook "Obshechaya embriologiya" [General Embryology], which was published in 1977 (third edition).

For Tekhnikums

1. Fedor Yevdokimovich Yevdokimov, chief of a department of the Central Scientific Research Institute of Information and Technical Economic Research, for the textbook "Teoreticheskiye osnovy elektrotekhniki" [Theoretical Principles of Electrical Engineering], which was published in 1981 (fifth edition).

2. Candidate of Technical Sciences Vladimir Il'ich Kurkin, chief of a chair of the All-Union Corresponding Electrical Engineering Institute of Communications, for the textbook "Osnovy rascheta i knostruirovaniya oborudovaniya elektrovakuumnogo proizvodstva" [The Principles of the Rating and Designing of Equipment of an Electronics Works], which was published in 1980 (second edition).

For the Secondary School

Candidate of Philosophical Sciences Mikhail Trofimovich Baranov, docent of Moscow State Pedogogical Institute imeni V.I. Lenin, Doctor of Pedagogical Sciences Taisa Alekseyevna Ladyzhenskaya, chief of a chair of the same institute, Candidates of Pedagogical Sciences Larisa Trofimova Grigoryan and Lidiya Aleksandrovna Trostentsova, senior scientific associates of the Scientific Research Institute of the Content and Methods of Teaching of the USSR Academy of Pedagogical Sciences, Candidate of Pedagogical Sciences Ivan Ivanovich Kulibabe, for the textbook for the fourth grade "Russkiy yazyk" [The Russian Language] (15th edition) and for the fifth and sixth grades "Russkiy Yazyk" (9th edition), which were published in 1982.

Secretary of the CPSU Central Committee K. Chernenko
Chairman of the USSR Council of Ministers N. Tikhonov

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